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THE AMERICAN HOSPITAL OF THE TWENTIETH CENTURY

By
EDWARD F. STEVENS, Architect

REVISED EDITION

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THE AMERICAN HOSPITAL OF THE TWENTIETH CENTURY

A treatise on the development of medical institutions, both in Europe and in America, since the beginning of the present century.

By
EDWARD F. STEVENS, Architect
Member of American Institute of Architects
Member of Royal Architectural Institute of Canada
Member of American Hospital Association

REVISED EDITION

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To

WARREN LEVERNE BABCOCK, M. D.

Superintendent of The Grace Hospital

DETROIT, MICHIGAN,

Whose encouragement and advice decided the writer of this book to devote his entire practice to institutions for the sick,

This book is respectfully dedicated.

FOREWORD TO FIRST EDITION

In visiting the hospitals of Europe, one finds on every hand splendid examples of hospital architecture. The administrators of these institutions take pride not only in laying before the foreign visitor for inspection the institution itself, but in providing him with carefully prepared plans and descriptions of the institution and its equipment. Everywhere one can obtain profusely illustrated books on the modern hospitals of the locality, books written and published by hospital administrators, architects, and engineers. These books are most helpful to the native as well as to the foreigner.

While visiting these foreign institutions, the writer has been asked repeatedly for the names of recent books on American hospitals. Such books are, alas, very few in number, and there are none commensurate with the rapid growth and development of the modern American hospital.

It is in response to this demand that the writer has endeavored to collect plans and information concerning a few of the many good institutions recently finished or under construction, with the hope that interest in the publication of such works will grow and that this book will be only a forerunner of much more comprehensive treatises. It is not the writer's intention to criticise the plans of the institutions here shown, but to present them as various solutions of the great problems of housing and caring for the sick and to point out a few of the findings of his own experience in the planning of more than fourscore hospitals and institutions. The field is so broad that it is impossible more than to touch upon the various points.

If frequent mention is made of hospitals in Europe, it is for the purpose of comparison, with the hope that the study and comparison may interest the reader, as it did the writer in collecting the data.

The chapters on the Ward Unit, the Surgical Unit, the Medical Unit, and the Equipment are taken largely from papers by the writer which were read before the American Medical Association and the American Hospital Association.

The chapters on Heating, Ventilation, Plumbing, and Landscape Work have been reviewed and suggestions given by prominent specialists in each line, for which advice the writer is much indebted.

EDWARD F. STEVENS.

Boston, February, 1918.

FOREWORD

TO

REVISED EDITION

The expressed appreciation of friends and readers as to the helpfulness of this book has led the writer to feel that it might be counted a success. In the second edition, herewith presented, the original text has been thoroughly revised, and much new material added, together with over one hundred and fifty new illustrations.

EDWARD F. STEVENS.

Boston, June, 1921.

THE AMERICAN HOSPITAL OF THE TWENTIETH CENTURY

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THE AMERICAN HOSPITAL OF THE TWENTIETH CENTURY

CHAPTER I.

In General

Historical. It would be vastly interesting to trace the evolution of hospital building and equipment from the crude structures of ancient times designed to house the sick to the comprehensive hospital of today, and to show how architecture and equipment have advanced stride for stride with medical and surgical progress; but in these days of vivid and insistent research and accomplishment there is no time for comparative speculation or historical review. All our energies are needed to keep pace with the newly devised methods which are constantly being put in practice and to facilitate these achievements by proper housing and equipment. Hospital building, since the beginning of the twentieth century, has increased enormously.

In the year 1911 the number of hospitals in the United States was said to be 2,500. In 1914 it was given as 7,000. In 1918 the number of hospitals was reported as being 7,158, with about 680,000 beds. Even with this vast number only about * "twelve per cent. of the sick people in this country who are ill enough to need a doctor are cared for in hospitals."

The line of advance has been influenced not only by the medical men and the nursing force, but by the social welfare worker, the hospital commission, the society to suppress tuberculosis, and the public at large; for the people are realizing that the hospital is built to benefit humanity and not to afford a place in which to die. "All hope abandon ye who enter here" no longer is the appropriate inscription for the hospital gate. But this advance has been by gradual steps—an improved ward unit here; better methods of service there; building up thus by experimental work and research a standard to meet the needs as they appear, and with the ever-increasing feeling that the welfare of the patient is of more importance than the zeal for science.

Hospital Sites. Before taking up the subject of the planning of the hospital itself, we must consider the very important subject of the site. Attractive locations for public buildings or even for residences are rarely suitable for hospitals.

The improvement of the patient, which is the fundamental purpose of the institution, depends in large measure on its situation and environment—the contour of the land, the surrounding country, the aspect, the accessibility for friends of the patient and for visiting physicians, remoteness from disturbing influences, a site of sufficient size to insure privacy, are all contributory elements for the process of recovery.

*Editorial Modern Hospital, Vol. VIII, No. 1.

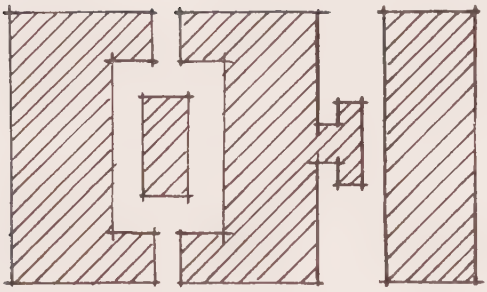


FIG. 1. DIAGRAM OF AN OLD ENGLISH HOSPITAL.

A southern exposure is always desirable, with the land sloping toward the south. If in the country, it is still more advantageous if the north is protected by evergreen trees.

Enough land should be provided to allow for growth. In building even the first portion, the future should be considered and the plans for the development of the entire institution studied and worked out so that the structures may be grouped to the best advantage. Whatever portion is built, it should be done with reference to the completed whole. Oftentimes the central or administration building is all that can be managed in the beginning, and in this must be disposed temporarily all the departments.

If the site is in the city, the same care in selection should be exercised. Smoke from adjoining chimneys, noise from nearby railroads, and proximity to a noisy thoroughfare or factory are menaces to be considered.

The suggestions for treating the grounds of an institution will be taken up in the chapter on Landscape Architecture.

Orientation. The orientation of a hospital, i. e., its setting with reference to light and sunshine, should be very carefully studied. The building should be placed with due regard not only to sunlight, which is as important a factor in a hospital as any one thing, but also with reference to the prevailing winds.

The early hospitals were congested groups of buildings, with little or no provision for light and air. (See diagram 1.) The grounds surrounding the hospital building should be flooded with sunlight, as well as the rooms occupied by patients, since cold and soggy ground will react unfavorably on buildings near it. Neither is a pavilion surrounding a courtyard good hospital planning, nor a U-shaped building, if the open side of the U is toward the north. By reference to the diagram (Fig. 2) taken from Atkinson, it will be seen that a rectangular building placed with its main axis running north and south will have a very small portion in shadow during the hours of daylight, while if the same building be placed with an east and west axis the entire north side will be in shadow. L and H forms of buildings, placed at varying angles to the north, will receive more or less sunlight according to the angles they face.

In planning the interior of the building, the portion which receives no sun at all during the day should be used, so far as possible, for utilities, staircases, and rooms not requiring sunlight, leaving for patients' rooms the sides which receive sunlight some portion of the day.

Buildings. The building or buildings should be simple in style and designed to make a pleasing impression upon the patients with the entrance speaking a welcome. The motto suggested for the Virchow, in Berlin, might well be placed over the entrance of many another hospital—"While treating the disease, do not forget to treat the man."

Hospital planning demands the same careful thought that is the foundation of any modern successful business enterprise. It is essential in the shoe factory, the paper mill, or the business establishment to so plan that the raw materials may be assembled and the finished product delivered with the fewest possible intervening motions. In the hospital the patient, the food and the treatment may be termed the raw material. Whatever conduces to recovery, the convalescent being the finished product, is of business importance in the hospital. The care, the comfort, the convenience and the food, together with the treatment, are the processes of manufacture. The hospital planner must seek to eliminate

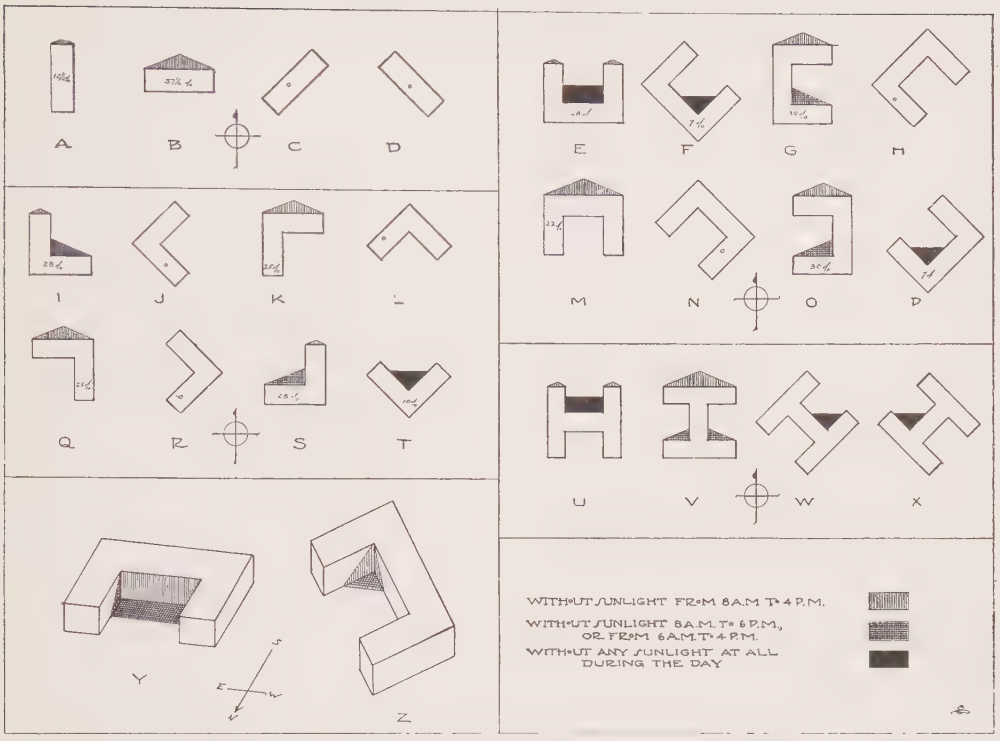


FIG. 2. ORIENTATION DIAGRAM (ATKINSON).

here all lost motion or unnecessary work.

In the factory the saving of time in any of the processes adds to the annual product, and in the hospital, likewise, careful scientific nursing, freedom from disturbing elements and everything that can help early convalescence, add to the efficiency of the institution. With the demands for accommodations that are made in these days, any factors that will increase the percentage of hospital capacity will be truly valuable. Location is here most important, an environment that will be an uplift to the patient; an outlook that while distant from industries may still remind the patient that he is a part of the world's life and activity; sunlight and ventilation and the modern fresh air balcony; these items and many others are factors toward increased hospital capacity. Internal disturbances should be avoided by planning the noisy rooms at a distance from the wards, and there are many important relations of the utilities to be considered, a single example of which may be the illumination in such a manner as to avoid eye-strain.

Rooms should be used as originally intended, if it is at all possible. Failure to do this is sometimes responsible for the inconveniences which occasion criticism.

Influence of European Hospitals. The good influence of European hospitals is shown in many of our modern American institutions. While we would not consider duplicating any one European institution, we do receive from them valuable suggestions for the solution of many a perplexing hospital problem. The general relation of one department to another, the method of preparing and serving food, the housing and treatment of patients, the orientation and environment, and the proportion of sunlight and shadow are some of the things upon which we may receive enlightenment. The hospital which would be perfect and which would fulfill the climatic conditions of southern France, however, would be entirely unsuitable in our northern states.

If we can put the European hospital on our dissecting table and remove the part we cannot use, we will still have a pretty good portion of the body left. By this metaphor I do not assume that hospital architecture is a dead subject—far from it. It is very much alive. Only last week our medical co-worker asked to have provision made for a patient in a warm, closed room, with hot baths; yesterday, the same patient was to be kept in the open air; today, ice baths are prescribed; and we must study the clinics very closely to find out what will be wanted tomorrow, for the hospital architect must meet the latest demand.

In one foreign institution we may find the ideal ward unit; in another, a service building of peculiar fitness; and in still another, the perfect floor (although the ideal hospital floor does not seem to have been discovered yet). One institution will have an ideal operating or medical department, while in others the architects will have solved new problems in detail and equipment.

The twentieth century hospital, whether built in Spain, Russia, or the United States, has one common condition in its program—that is, *to give the patient the best chance for recovery.* If a more thorough study of sanitation, ventilation, nursing, disturbing elements, orientation, and environment, one or all, will help us to design buildings that hasten convalescence and produce the desired results, then that information must be obtained; and, if necessary, we should be willing to circle the globe for it.

Some European Hospitals. A few examples of European hospitals will show some of the features which have interested the writer in his study of the subject.

The new *King's College Hospital,* at Denmark Hill, London, is accepted as one

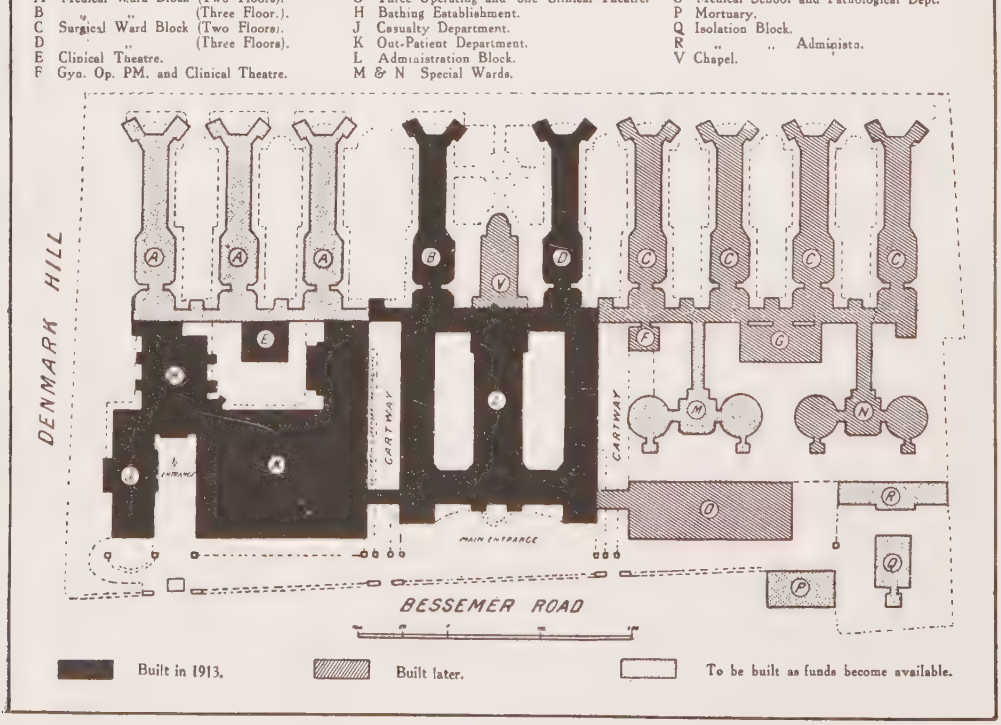


FIG. 3. PLOT PLAN, KING'S COLLEGE HOSPITAL, LONDON, ENGLAND.

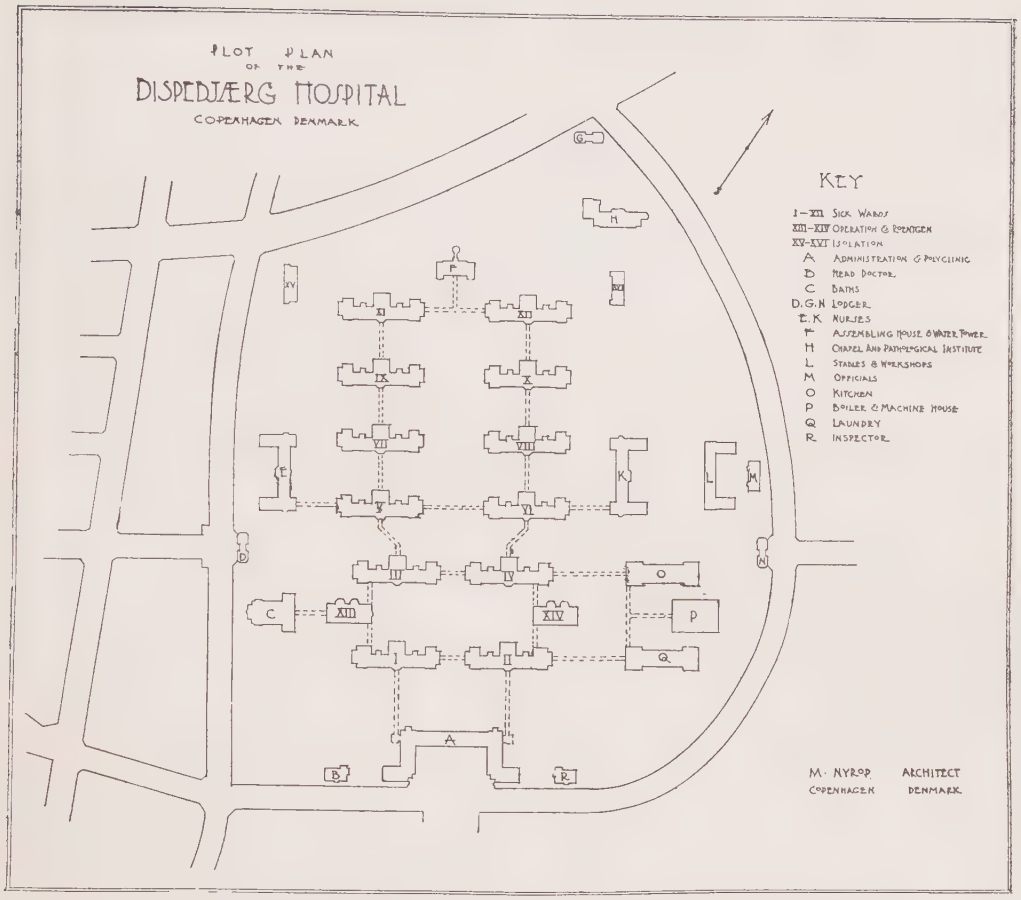


FIG. 4. PLOT PLAN, BISPEBJERG HOSPITAL, COPENHAGEN, DENMARK.

of the best English hospitals, and is in very many ways ideal. Its general plan is shown in Fig. 3. It occupies a block of ground in a crowded section of South London. Its present capacity is 600 patients.

The *Bispebjerg Hospital,* Copenhagen, Denmark (Fig. 4), designed by Professor Martin Nyrop, has an ideal site containing fifty acres. It is located on slightly rising ground, and advantage has been taken of the natural contours to produce terraces and excellent landscape effects. The design of the group is simple and dignified. There are forty-six buildings, two or three stories high. These buildings, while isolated above ground, are all connected by wide, well-lighted, underground corridors. The bath-house, while far removed from the ward buildings, serves for out patient clinics as well as for hospital patients. The grounds are laid out with special care for the comfort of the patients, with arbors, benches, and fountains.

Perhaps the most familiar of the modern hospitals is the Virchow (Fig. 5) at Berlin. This was built by Architect Ludwig Hoffmann in 1907, and is of the pure pavilion plan. It has a capacity of two thousand beds. With the exception of two ward units connected with the surgical or operating buildings and the administrative group, the buildings are all isolated and are of one story so far as the patients are concerned. Owing to the ease with which the patients can be taken from the buildings, the beautifully laid-

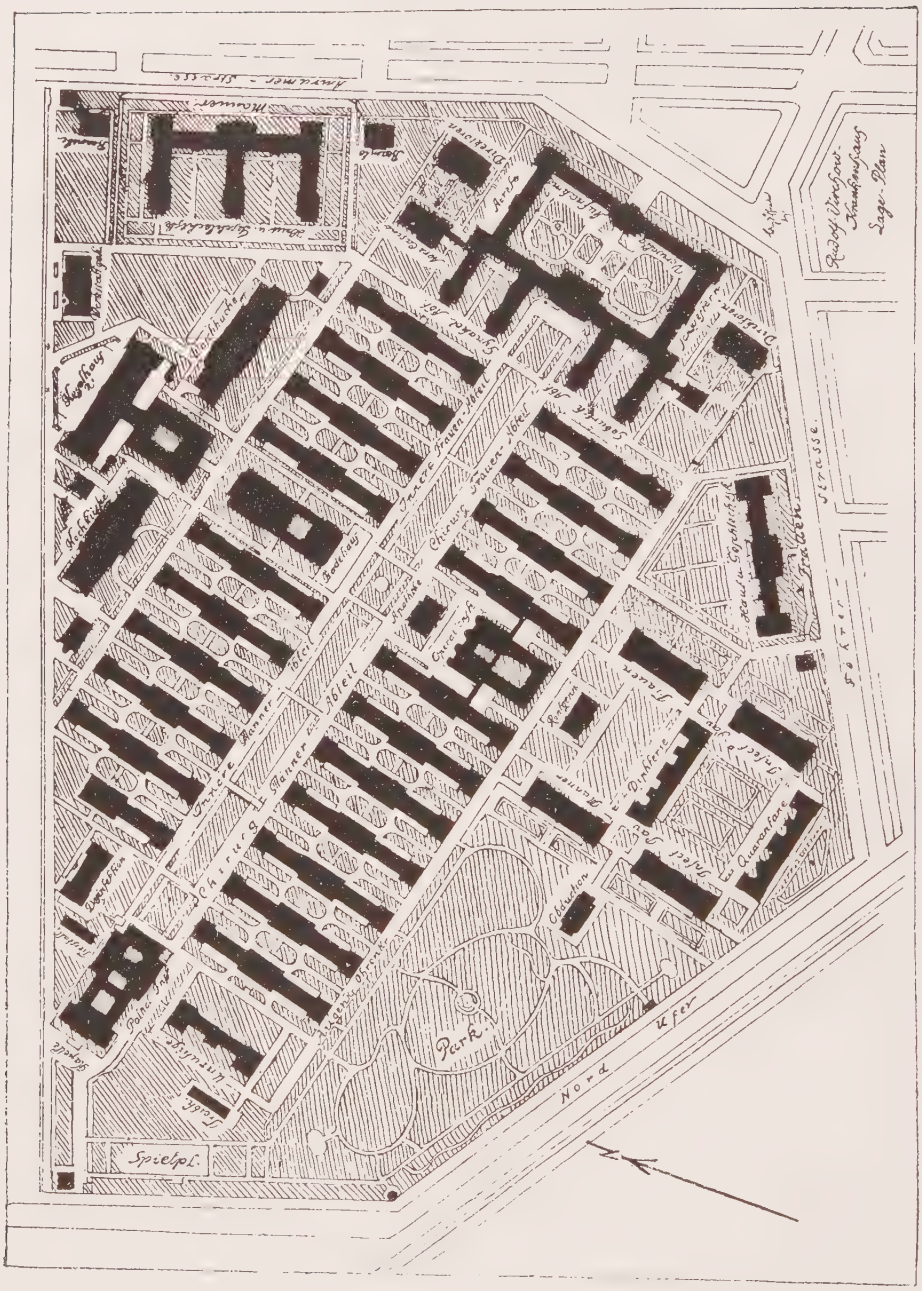


FIG. 5. PLOT PLAN, RUDOLPH VIRCHOW HOSPITAL, BERLIN, GERMANY.

out grounds and parks, with their walks and drives, become the ideal place for convalescents. One of the rules of these parks is that on every third day they are for the sole use of the patients, every third day for the sole use of the staff, and every third day for the sole use of the nurses.

The surgical group, on the left of the main axis, is connected with the operat-

ing building, while the medical group has the bath-house occupying the same strategic position. The isolation group occupies a portion of the extensive grounds on the south, and the service buildings on the north.

The ward pavilions, of which there are twenty practically alike, consist of two twenty-bed wards, with service at the center and at the ends, and with room for attendants in the second story of the central portion.

The floors of the wards are elevated but little above the ground, giving a ready entrance for the patients and for church. On the surgical side, three of the pavilions are connected by corridors, while the fourth is isolated. All other buildings throughout the group are isolated.

One of the most modern and complete hospitals in Germany is *Munich-Schwabing* (Fig. 7). In this building Architect Richard Schachner has embodied the best of German planning and coupled with it the most valuable of American ideas. While he has separate pavilions, he also has everywhere connecting corridors above ground, except to the contagious and special treatment buildings,

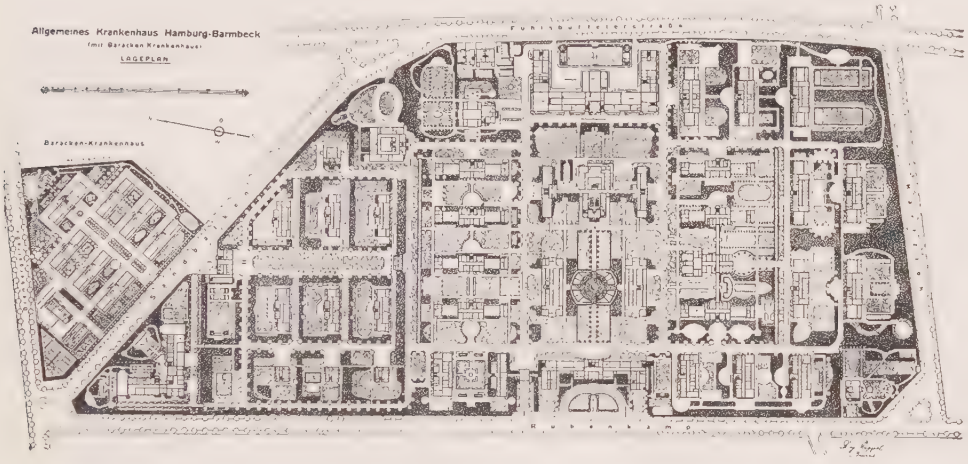


FIG. 6. PLOT PLAN, BARMBECK HOSPITAL, HAMBURG, GERMANY.

the food, both of which are carried overground.

The new *Barmbeck III,* City Hospital at Hamburg (Fig. 6), built by Baurat F. Ruppel, consists of forty-four buildings, and will house fifteen hundred patients. In this plan Ruppel has varied somewhat from his usual method, in placing the center of the medical unit—the bath-house—on the axis of his plan. In the St. Georg, the Eppendorf, the Virchow, and other large German hospitals the bath-house is placed on the medical side, balancing the operating building as the center of the surgical side.

In the Barmbeck, coupled with the medical center, is the patients' entertainment hall, which is used also for a and between these there are underground passageways.

The administration is in the center, flanked by the chapel and the nurses' residence on one side and by the office and the home for the staff on the other. The surgical group has for its center the operating building; and the medical unit, a splendid bath-house. This bath-house is considered the finest in Europe connected with a general hospital, and will be described in another chapter.

American Hospitals. The *Peter Bent Brigham Hospital* (Fig. 8), created by the bequest of six million dollars from the man for whom it is named, was opened in 1913. In the year 1907 a competition was held by the Trustees, seven

1. Main building.
2. Chapel.
3. Sisters' building.
4. Administration building and apothecary.
5. Benzine building.
6. Operation building.
7. Main bath.
8. Kitchen.
9. Male out-patients' building.
10. Female out-patients' building
11, 13. Male patients' buildings.
12, 14. Female patients' buildings.
15. Disinfecting building and laundry.
16. Garden and workshop.
17. Machinery building.
18. Animal experiment building.
19. Pathological building.
20. Segregation building.
21. Contagion building.
22. Skin and venereal building.
23. Mental disease building.
24. Children's building.
25. Gynecological building
26. Janitors' quarters.
27. Director's residence.
28. Public lavatory.
29. Main administration building and residence.
30. Coal house.
31. Building for help of electric plant.

FIG. 7. PLOT PLAN, MUNICH-SCHWABING HOSPITAL, MUNICH, GERMANY.

architects being invited to submit plans, which resulted in the selection of Codman & Despradelle. Perhaps no hospital in America has had more study and thought put into it than has this institution, and the plan is worthy of much study. Under the guidance of the superintendent, Dr. H. B. Howard, the architects and engineers have developed a comprehensive plan which gives the patient every advantage of open air, sunlight, and quick and quiet service.

In planning for the *Cincinnati General Hospital* (Fig. 10), the City was wise in the selection of a site which would give sufficient room for growth. It was also wise in its appointment of the late Dr. Christian R. Holmes as medical adviser, since the time and thought he gave to this institution, after studying foreign and American hospitals, has made it one of the leading hospitals of the world. Dr. Holmes was ably assisted by the architects, Samuel Hannaford & Son.

The grouping of the buildings of the *Royal Victoria Hospital,* Montreal, Can-

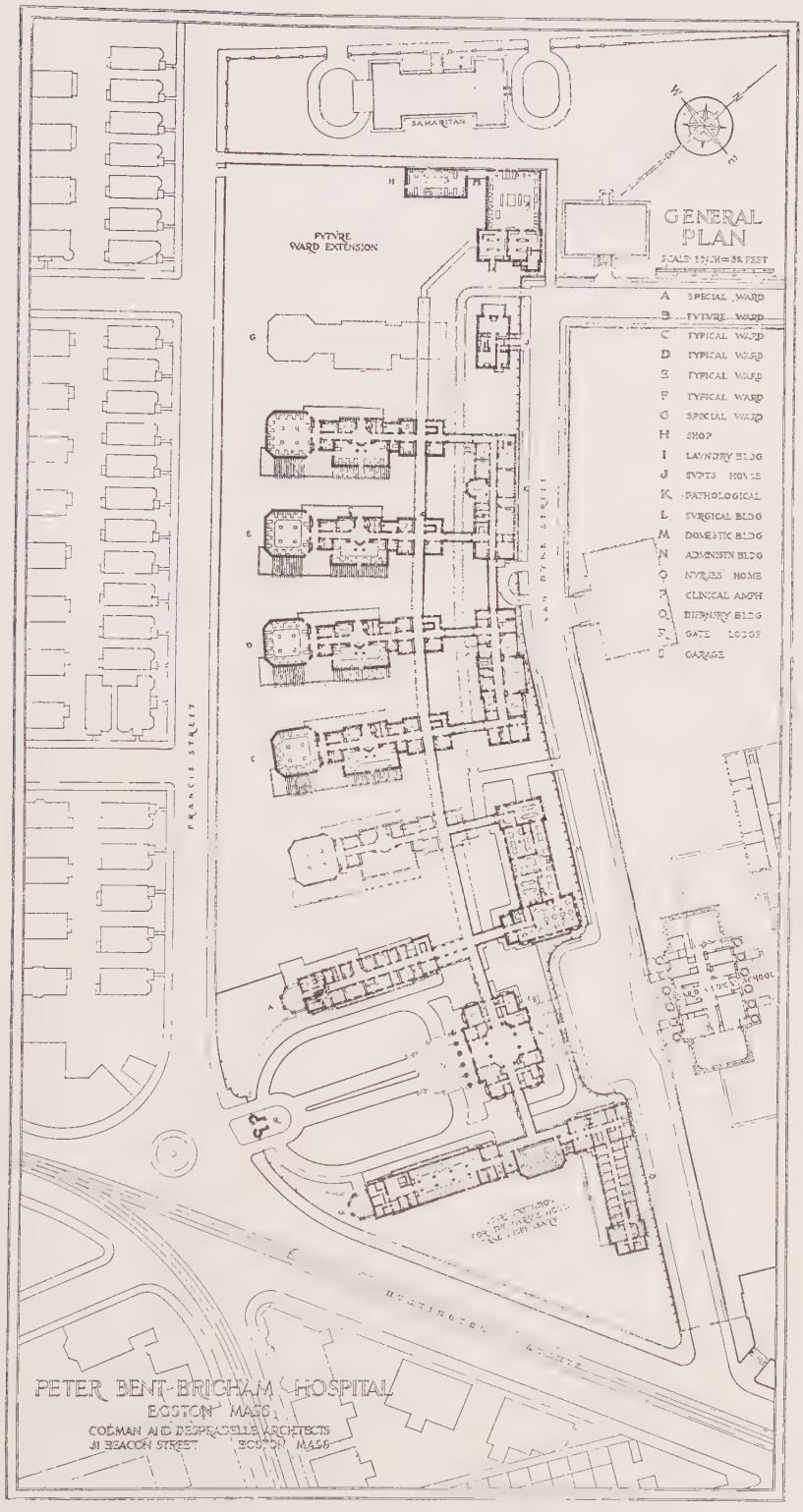


FIG. 8. PLOT PLAN, PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.

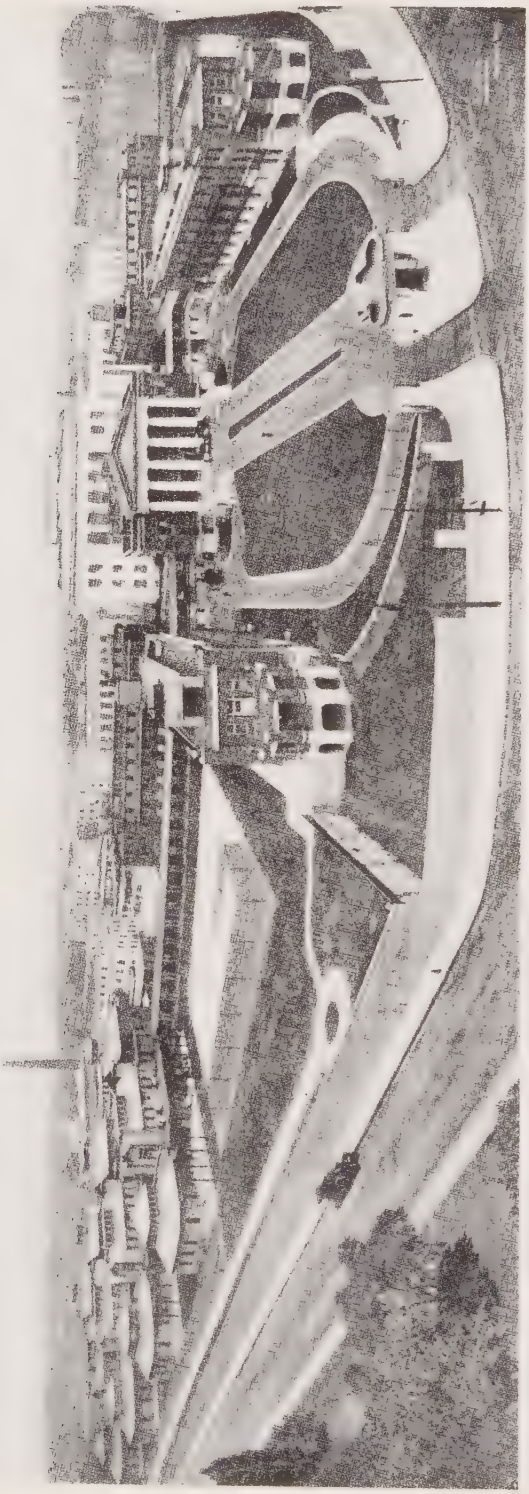


FIG. 9. GENERAL VIEW, PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.

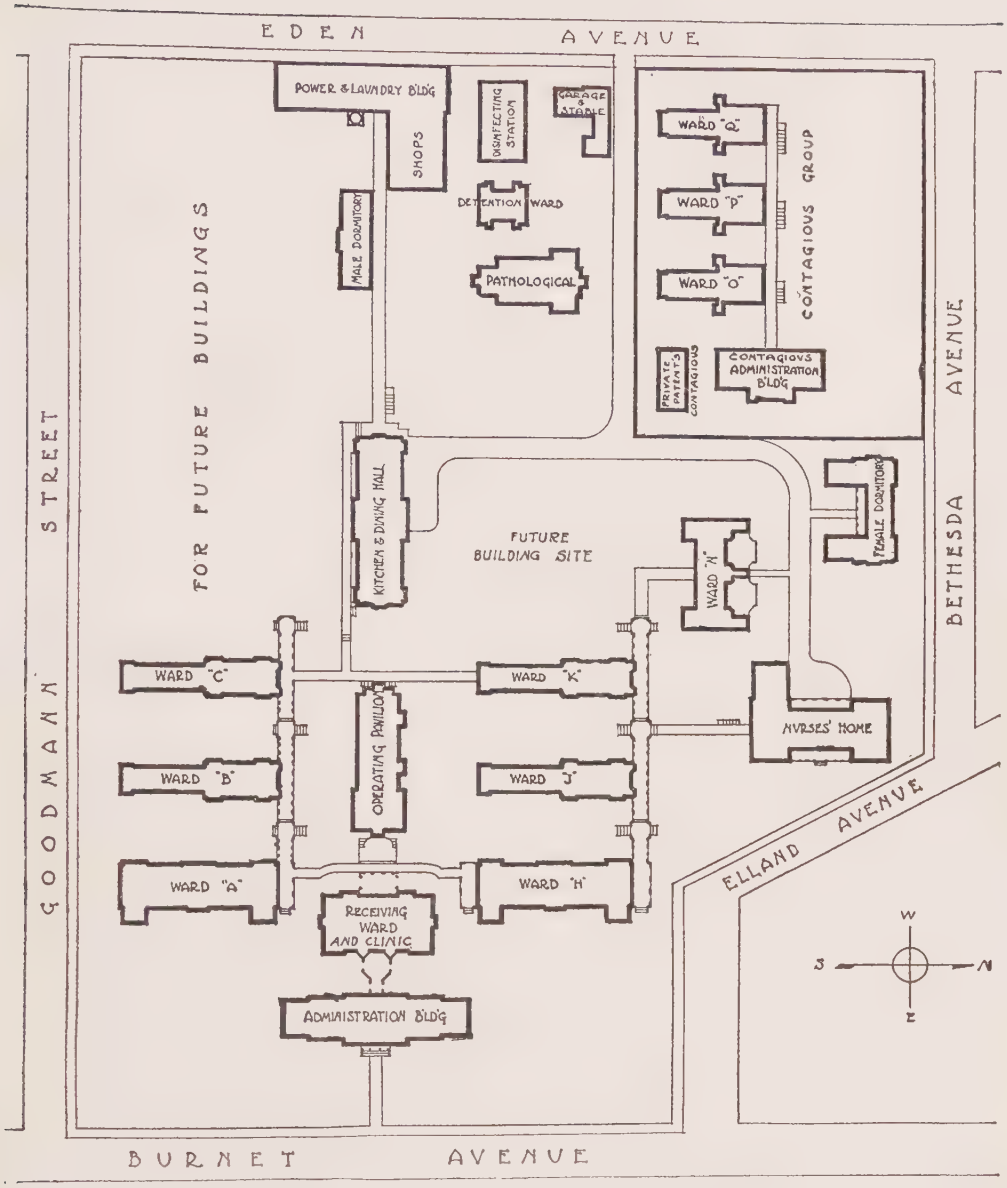


FIG. 10. PLOT PLAN, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.

ada (Fig. 11), is interesting because of its situation on a hillside overlooking the city. The new private pavilion is the highest building of the group, one hundred feet above the rest of the hospital. Back of it is the patients' park.

In the *Notre Dame Hospital,* Montreal (Fig. 88), the problem was somewhat unique. The site is a restricted one, and on the south side of the lot an existing building had to be recognized and used to the best advantage. Another element in the problem was the steep grade. An H-shaped building was adopted as giving the maximum amount of service for the available land. Its left wing will not be built at first. Provision is made when it is completed for 500 patients, ward and

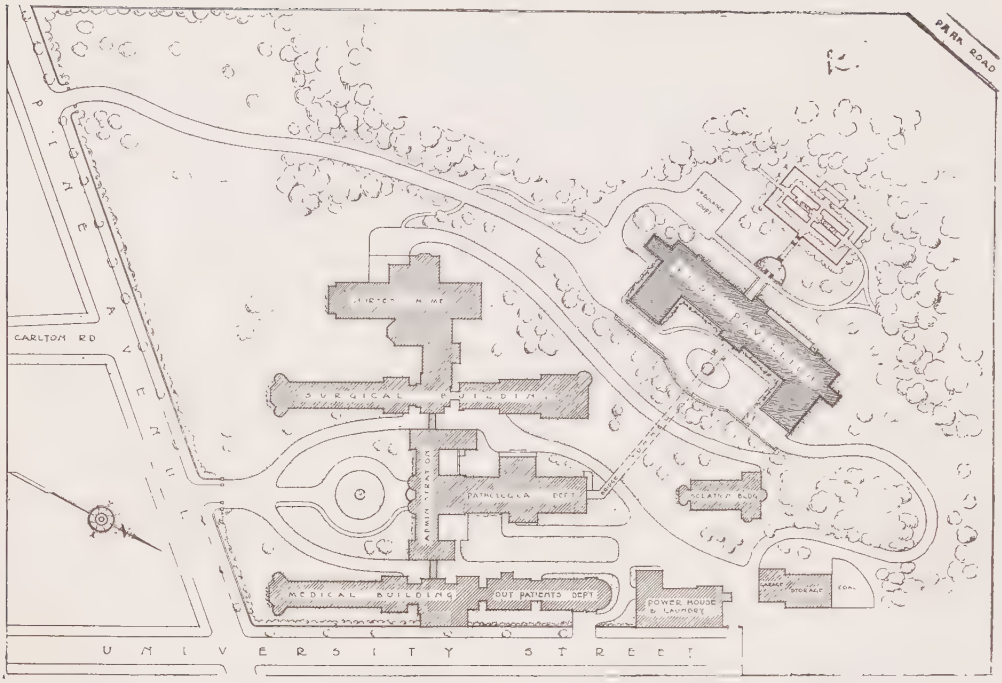


FIG. 11. PLOT PLAN, ROYAL VICTORIA HOSPITAL, MONTREAL, QUEBEC

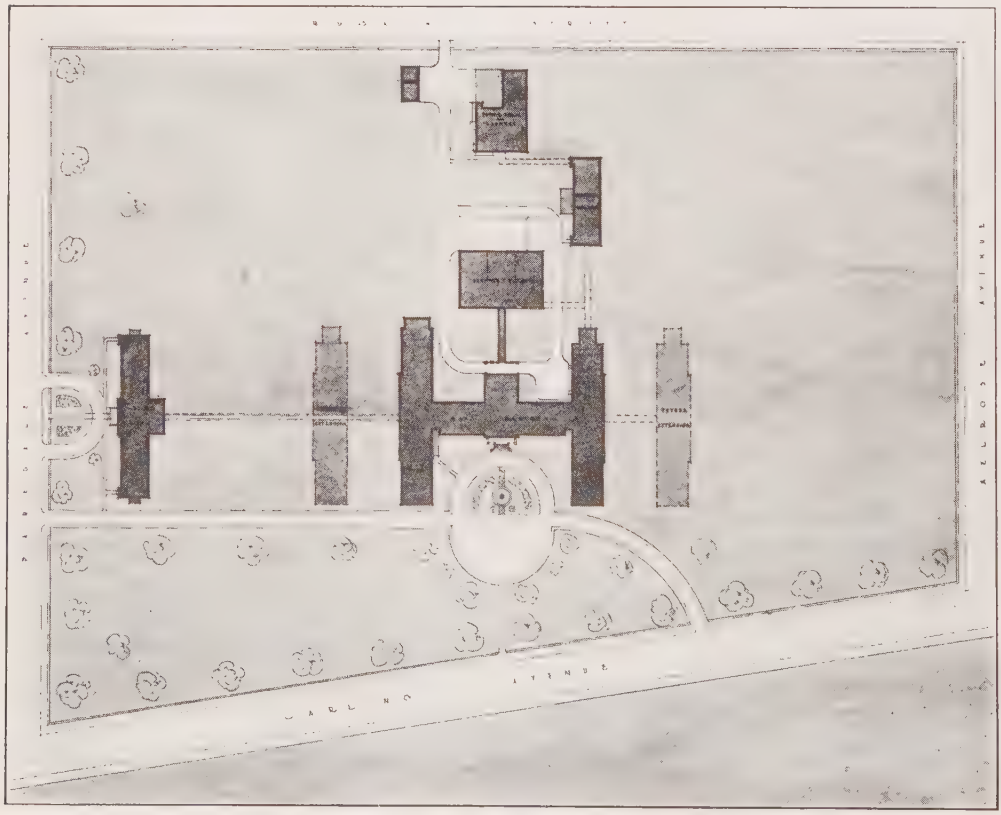


FIG. 12. BLOCK PLAN, OTTAWA CIVIC HOSPITAL, OTTAWA, ONTARIO
Stevens & Lee, Architects.

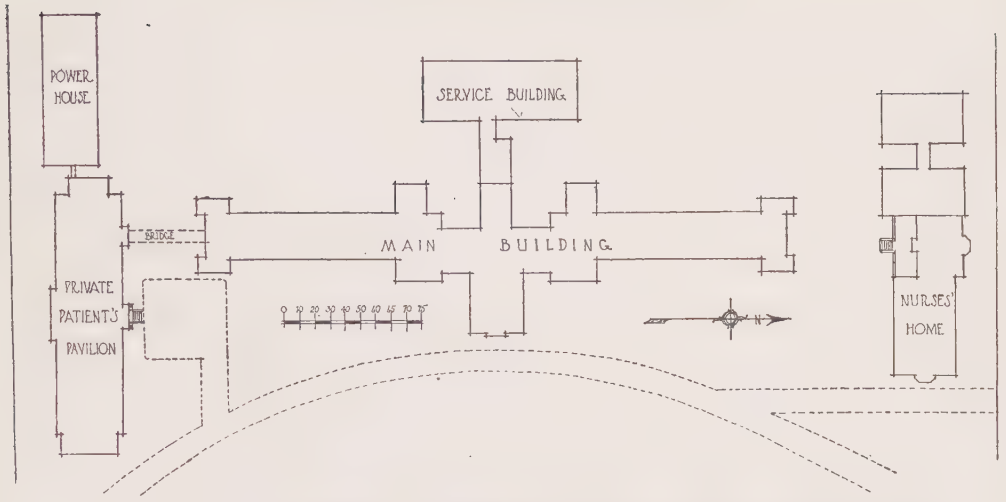


FIG. 13. PLOT PLAN, VICTORIA GENERAL HOSPITAL, HALIFAX, NOVA SCOTIA.

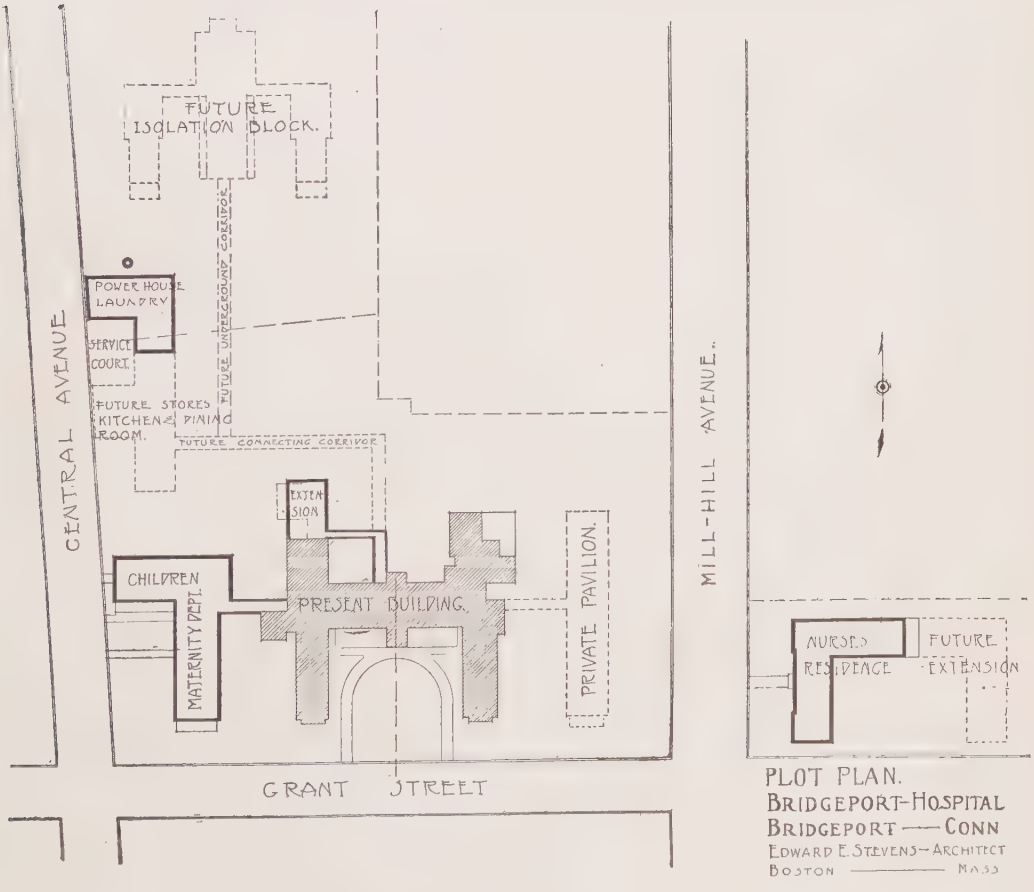


FIG. 14.

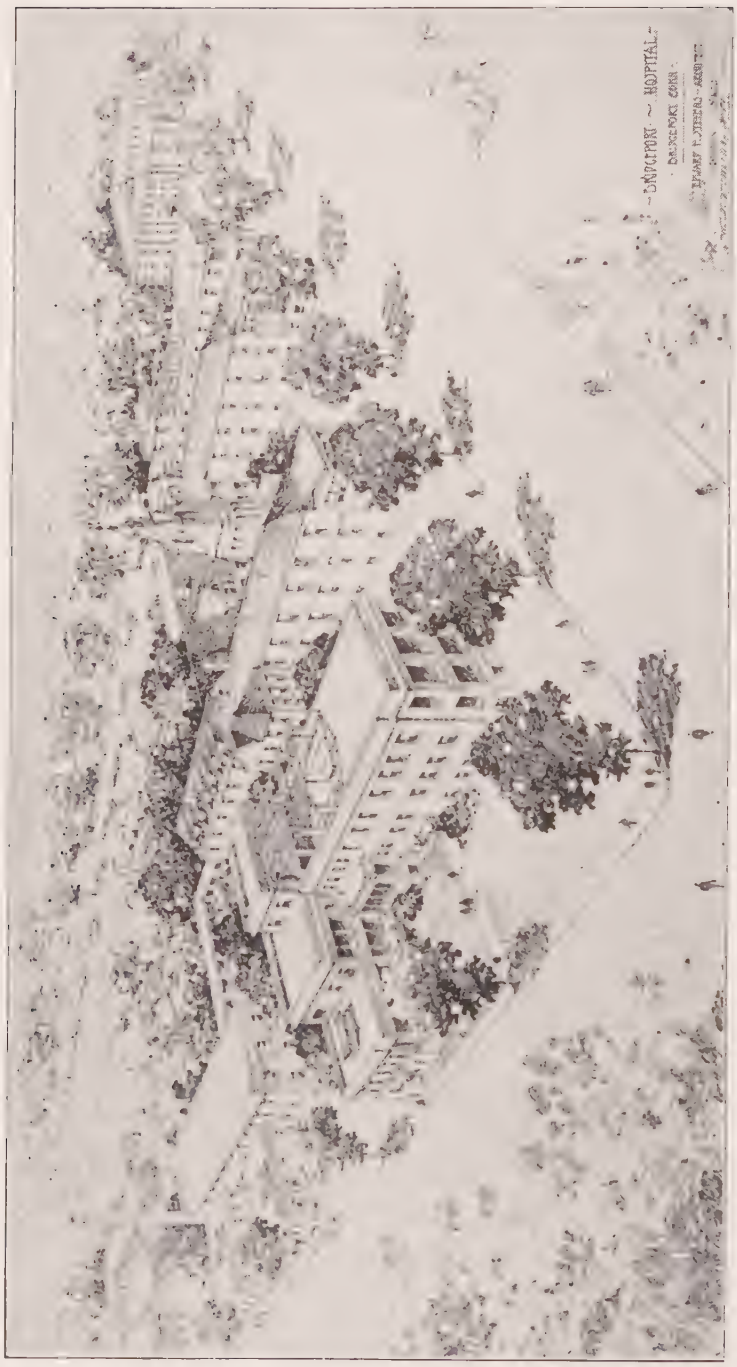


FIG. 15. BIRD'S EYE VIEW OF BRIDGEPORT HOSPITAL DEVELOPMENT

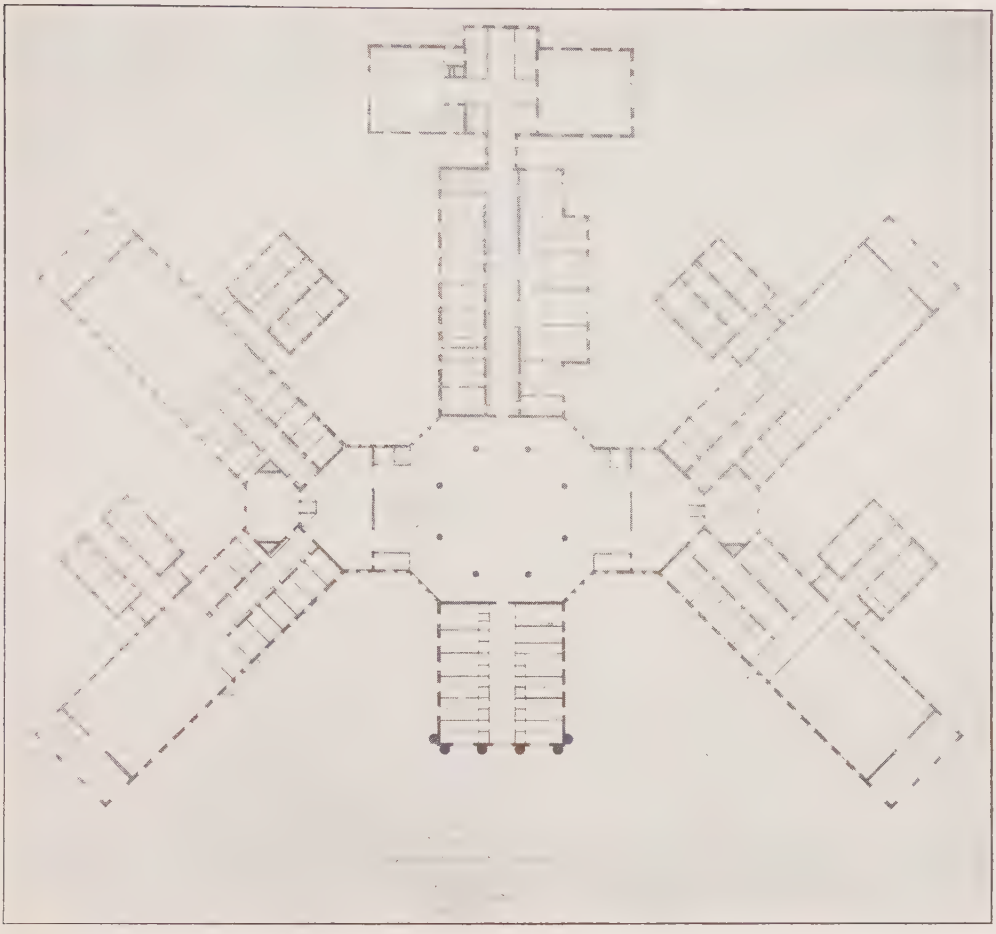


FIG. 16. TYPICAL FLOOR PLAN, GOOD SAMARITAN HOSPITAL, CINCINNATI, OHIO
Gustave W. Drach, Architect.

private. A residence for the Sisters and one for the nurses will be added later.

In locating the *Ottawa Civic Hospital,* Ottawa, Canada (Fig. 12), careful study was made to secure a high, well-drained site, near the city, of sufficient area to provide for future extensions, and for recreation grounds for patients and staff. Though set in a plot of twenty-three acres, it is a block, or self-contained, building. Under ordinary conditions, a hospital of two-story, separate pavilions would have been built; but with the present enormously increased cost of building, high wages for the help to care for it, difficulties in getting nurses, etc., a concentrated service is more economical and more manageable.

The H-shaped building, practically two T-shaped buildings, far enough apart for air and sun, is planned as two services, there being no necessity for crossing between the two. Elevators take the place of wagons or carriers overground, thus doing mechanically what would otherwise be done manually. The section of the building (Fig. 85) shows the relation of the various departments. It is as good practice to divide the hospital horizontally as vertically. Separate floors are as disconnected as separate buildings.

The *Victoria General Hospital,* Halifax, Nova Scotia (Fig. 13), and the *Bridgeport Hospital,* Bridgeport, Conn. (Fig. 14), show how additions may be successfully made to existing buildings.

FIG. 17. THE GOOD SAMARITAN HOSPITAL, CINCINNATI, OHIO.
Gustave W. Drach, Architect.

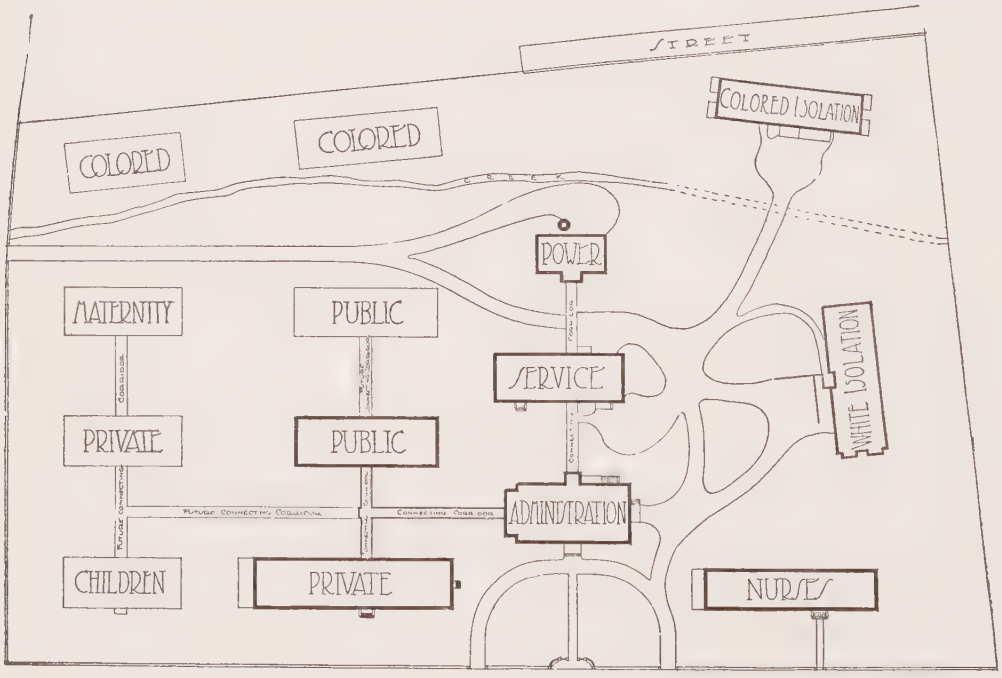


FIG. 18. PLOT PLAN—ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.

The Good Samaritan Hospital, Cincinnati, Ohio (Figs. 16, 17), is an interesting example of an orientation planned with a view to securing the greatest amount of light and sunshine. The main building, five, and in parts seven stories high, is in the form of an irregular St. Andrew's cross, the center being a huge rotunda. A feature of the plan is the locating of the serving kitchens at the juncture of the wings, each supplying two sections of the building.

The *detached buildings* of many of the European hospitals seem ideal for the climate for which they are built; but in America, especially in the rugged climate of the northern part, protection must be given the patient in going from building to building, and connecting corridors, at least, are generally provided. In the mild climate of Florida, however, at *St. Luke's Hospital* (Fig. 18), Jacksonville, it has been possible to build detached pavilions with open corridor connection.

The group will consist of fourteen buildings, eight of which are finished and occupied. The administration building is in the center, with the ward and treatment buildings to the south. There are six or eight of these ward and treatment buildings, only two being now built. The domestic building, containing kitchen and dining-rooms, is directly behind the administration, while the power house and laundry are still farther back. The nurses' residence occupies a position corresponding to that of the private ward. Two buildings for the care of communicable diseases are also provided.

The administration building contains not only the offices of the institution, but also the accident department, the admitting department, and, in the second story, a thoroughly equipped operating department and medical treatment rooms.

The ward unit is planned to eliminate, as much as possible, the general noise of the hospital, and to give an abundance of open-air balconies. The private ward unit has a large open-air ward on the second floor.

The isolation building is so planned that patients can be treated individually, after the manner of the Pasteur Hospital at Paris. (See description in Chapter VIII.)

Memorial Buildings. A hospital building or ward is certainly a most satisfactory memorial to anyone, since it is one which functions twenty-four hours in a day, every day in the year. As a memorial to the men who died in the world war there would seem to be no more fitting monument. In it should be placed the tablets or other records of the names of those in whose memory it was built.

CHAPTER II.

The Administration Department

FIG. 19. MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.
(From an old wood cut.)

Whether it is a large institution or a hospital of twenty beds there must be headquarters for the administrator or director. This department may vary from a single room to a vast building with admitting rooms, waiting rooms and staff rooms.

From careful observation, it would seem desirable to have the administrative unit the center through which all patients (except stretcher cases) and all their friends shall pass, and where the general business of the institution shall be conducted.

Waiting space should be provided for visitors who may come in numbers before the visiting hour. There should be offices of the superintendent, admitting officer, bookkeeper, and superintendent of nurses; the staff and board room, and the medical library. The sleeping and sitting rooms of the house staff and internes can be located in this department building.

In the smaller hospital, the laboratories and Roentgen-ray, the autopsy and lecture rooms, and at times the kitchen department work out most satisfactorily in this unit.

The entrance to this department should be carefully studied from the psychological standpoint, with reference to the effect on the would-be patient. Decoration should play an important part in it. The architect should be allowed to depart from the severe design which characterizes other portions of the building, though over-elaboration should be avoided on account of its obvious expense.

In the entrance hall or rotunda should be located any memorial or other tablets which are desired. Soldiers' and sailors' memorials are just now in demand. These tablets should be so designed as to be a part of the wall panelling, not merely hung in a vacant space (Fig. 23). A good design is a grate fireplace, with the tablets forming a part of the frieze of the mantel.

The walls and ceiling of the entrance hall may be decorated with bas reliefs or paintings. The furniture should be of a type at once dignified and decorative. The floors may be of tile or marble, with cork tile in the working space for the comfort of the attendants' feet. Exposed radiators should be avoided; they may be concealed behind removable grille work, as in Fig. 24.

The information desk should be in

FIG. 21. HOSPITAL ENTRANCE.
Edward F. Stevens, Architect.

FIG. 20. ENTRANCE GATES, ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL.
Stevens & Lee, Architects.

evidence, and should be either labelled or so plainly indicative of its purpose that there shall be no hesitation on the part of the person who enters as to where to go for direction. At this desk there should be every facility for answering questions in regard to the condition of patients, the location of wards or rooms, hospital rules, payments, hotels, restaurants, car lines, trains, etc.

To show that a hospital can be successfully run without a so-called administration building, it may be noted that the *Massachusetts General Hospital,* Boston, one of the oldest in the country, built by Architect Bulfinch in 1821 (Fig. 19), did not have an administration building until 1916; so that, with the hundred years in which to study the needs, it is not surprising that the plan is well-nigh perfect (Figs. 26, 27).

To the entering visitor, the broad marble information counter at once invites confidence; and with the ample waiting-room in the center and the various offices

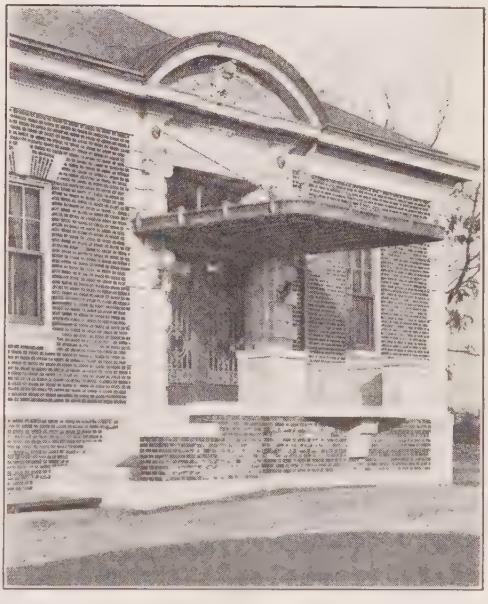


FIG. 22. AMBULANCE ENTRANCE, BROCKTON (MASS.) HOSPITAL.
Kendall, Taylor & Stevens, Architects.

FIG. 23. ENTRANCE HALL, BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL, IPSWICH, MASS.
Edward F. Stevens, Architect.

of the institution around the perimeter, one is not apt to lose his way.

The plan is self-evident. The casualty entrance from the same court comes into the basement (Fig. 27), where there are minor operating and treatment rooms. In the upper stories are the rooms of the staff.

At the *Peter Bent Brigham Hospital* (Fig. 9), the design is more imposing. In the large rotunda (Fig. 28) the circular desk is obviously the source of information. The offices of the superintendent and his assistants, and that of the superintendent of nurses, as well as the admitting and examining rooms, are grouped around the rotunda. In the basement are located the Roentgen-ray department and the pharmacy. The central location of this building, connecting as it does the approach to all departments of the institution, simplifies the problem of surveillance.

In the *Ottawa Civic Hospital,* Ottawa, Canada (Fig. 80), a large lobby is provided. The information desk is plainly in view at the right of the entrance, the cashier's desk just around the corner for privacy's sake. The offices of the superintendent, assistant superintendent, and superintendent of nurses are at the rear, somewhat secluded. The record rooms are easily accessible, and there are ample rooms for the clerical force. A doctors' coat room, library, consultation room, etc., are provided.

In the *Notre Dame Hospital,* Montreal (Fig. 88), the main entrance is formal and dignified. The rather simple administration portion is concentrated near the entrance. The wards for patients begin

very near to the administration, but are shut off from it.

At *St. Luke's Hospital,* Jacksonville, Fla. (Figs. 29, 30), the administration building houses the operating and accident rooms, the medical treatment, X-ray, laboratory, and the superintendent's and internes' quarters.

At the *Ohio Valley General Hospital* which is a block-type, self-contained building, the ground and first stories are set aside for administration and domestic purposes. The main and ambulance entrances, the laboratories and treatment room, the out-patients' and the isolation rooms are on the ground floor (Fig. 99), while the main administrative offices, the internes' quarters, the kitchen and dining rooms are on the first floor (Fig. 100). This concentrates all of the non-profit-bearing portion of the building near the ground and the less interesting outlook.

FIG. 28. VIEW IN ROTUNDA, PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.
Codman & Despradelle, Architects.

Fig. 31 shows a simple, homelike entrance to a small hospital.

In large hospitals, it may be found desirable to have a receiving department,

FIG. 24. ENTRANCE HALL, ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL.
Stevens & Lee, Architects.

FIG. 25. ADMINISTRATION BUILDING, MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.
Coolidge & Shattuck, Architects.

PLAN OF FIRST FLOOR

1 Main entrance to Hospital
2 Information office
3 Stairs to public toilet for men
4 Waiting room for patients to be admitted
5, 6, 7, 8, 9, 10 Telephone booths
11 Admitting Physician's office
12 Outside corridor to yard
13 Record Clerks' office
14 Corridor to Main Hospital
15 Cashier's office
16 Elevator
17 Bookkeeper's vault
18 Bookkeeper's office
19 Office of First Assistant Resident Physician
20 Office of Resident Physician
21 Trustees' room
22 Private toilet
23 Cleaners' closet
24 Clerks' office
25 Office of Superintendent of Nurses
26 Office of Assistant Superintendents of Nurses
27 Office of Assistant Resident Physicians
28 Telephone switchboard room
29, 30 Reception rooms
31 Office of Assistant Resident Physician
32 Parcel room
33 Main waiting room for visitors
34 Stairs to public toilet for women

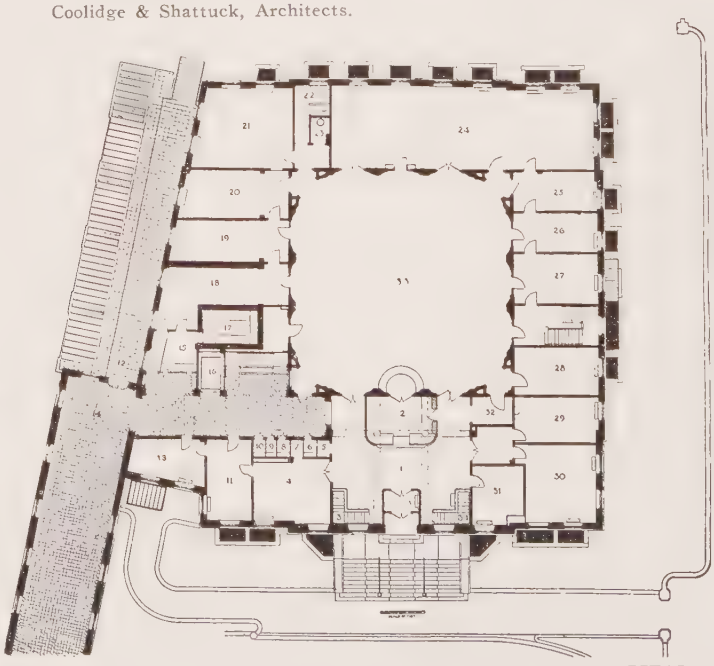
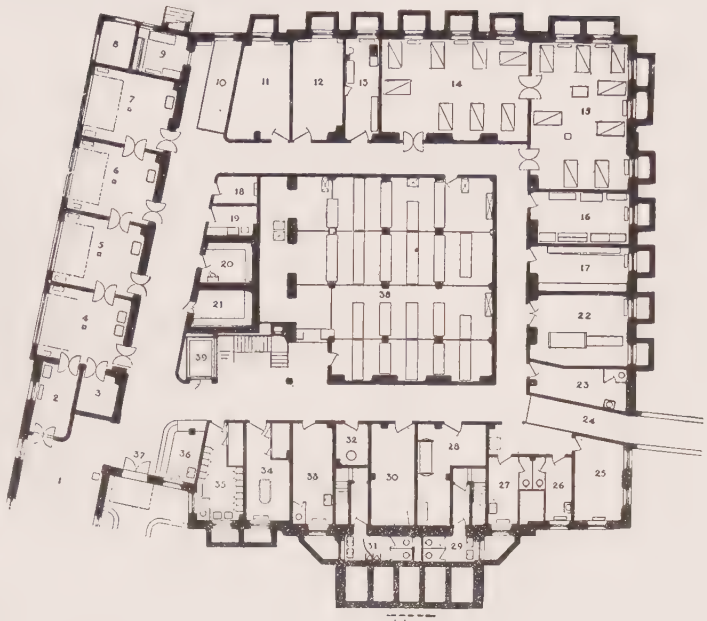


FIG. 26. FIRST FLOOR, ADMINISTRATION BUILDING, MASSACHUSETTS GENERAL HOSPITAL. BOSTON, MASS.
Coolidge & Shattuck, Architects.



PLAN OF BASEMENT FLOOR

1 Corridor to ambulance entrance
2 Isolation room
3 Dark room
4, 5, 6, 7, 11, 12 Operating and examining rooms
8 Air chamber
9 Splint room
10 Covered incline to possible future buildings
13 Ward service room
14, 15 Male and female emergency wards
16 Ward kitchen
17 Linen room
18 Blanket-warming room
19 Sterilizing room
20 Instrument room and medicine closet
21 Storage vault
22 Disinfecting room
23 Staff dressing room
24 Tunnel under Fruit St., to Nurses' Home
25 Women employees' rest room
26 Women employees' dressing room
27 Patients' toilet (women)
28 Apparatus room
29 Public toilet for women
30 Storage
31 Public toilet for men
32 Cleaners' closet
33 Patients' toilet (men)
34 Emergency-ward bathroom
35 Dressing room for men employees
36 Emergency-ward office
37 Entrance for ambulatory patients
38 Central clothing room
39 Elevator

FIG. 27. BASEMENT FLOOR, ADMINISTRATION BUILDING, MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.

Coolidge & Shattuck, Architects.

located near the administration portion of the building. The *Cincinnati General Hospital,* Cincinnati, O., has an entire building used for this purpose (Fig. 32), and for ward clinics, an interesting and economical combination.

In the *Ottawa Civic Hospital,* Ottawa, Canada, the admitting department for all patients is on the ground floor (Fig. 79). The ambulance entrance is ample in size and entirely protected from the weather. The admitting rooms are near this entrance. There is a separate admitting department for maternity cases. There are two small detention wards for cases coming in at night or those suspected of being contagious.

It may be found of advantage to use the same admitting room for both in and out patients, since the out-patient department is sometimes the sifting ground for in-patient material. The ground floor of the *Notre Dame Hospital* of Montreal (Fig. 87) shows an example of this arrangement.

FIG. 29. ADMINISTRATION AND OPERATING BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.

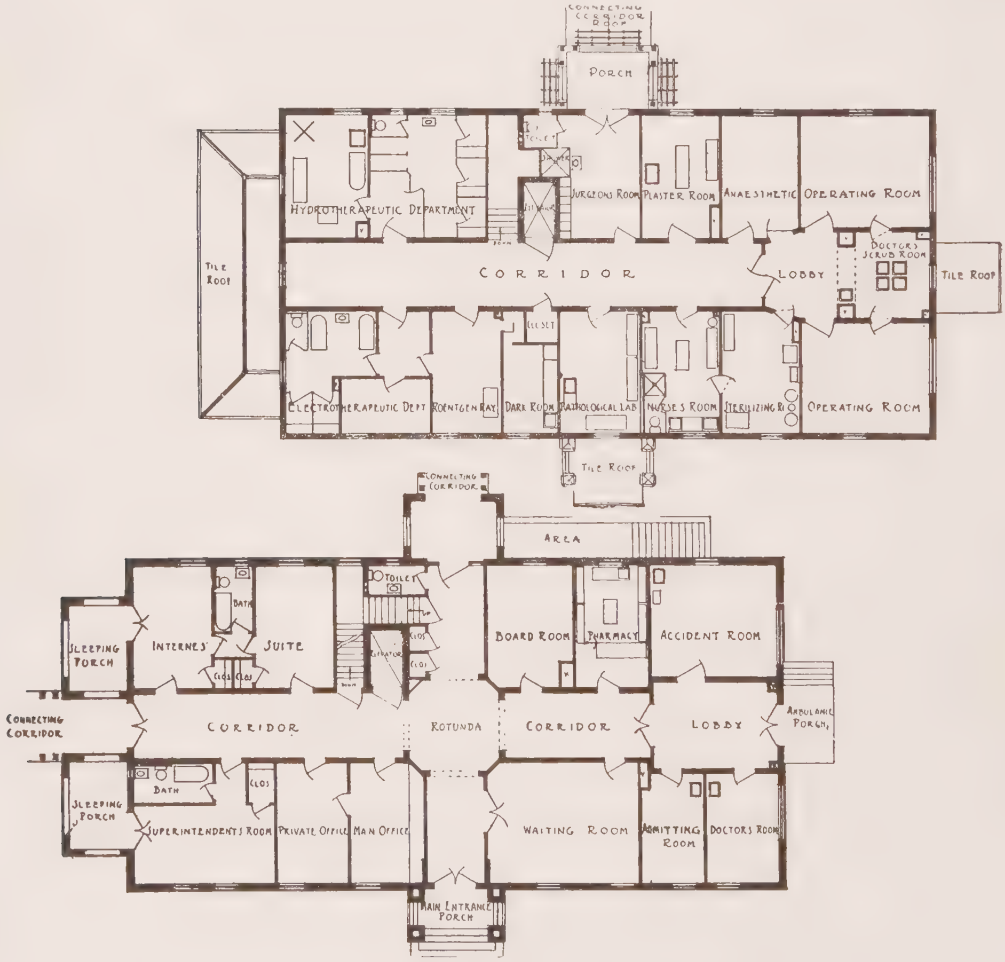


FIG. 30. FLOOR PLANS, ADMINISTRATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.

Edward F. Stevens, Architect; Mellen C. Greeley, Associate Architect.

FIG. 31. ENTRANCE TO SMALL HOSPITAL.
Kendall, Taylor & Stevens, Architects.

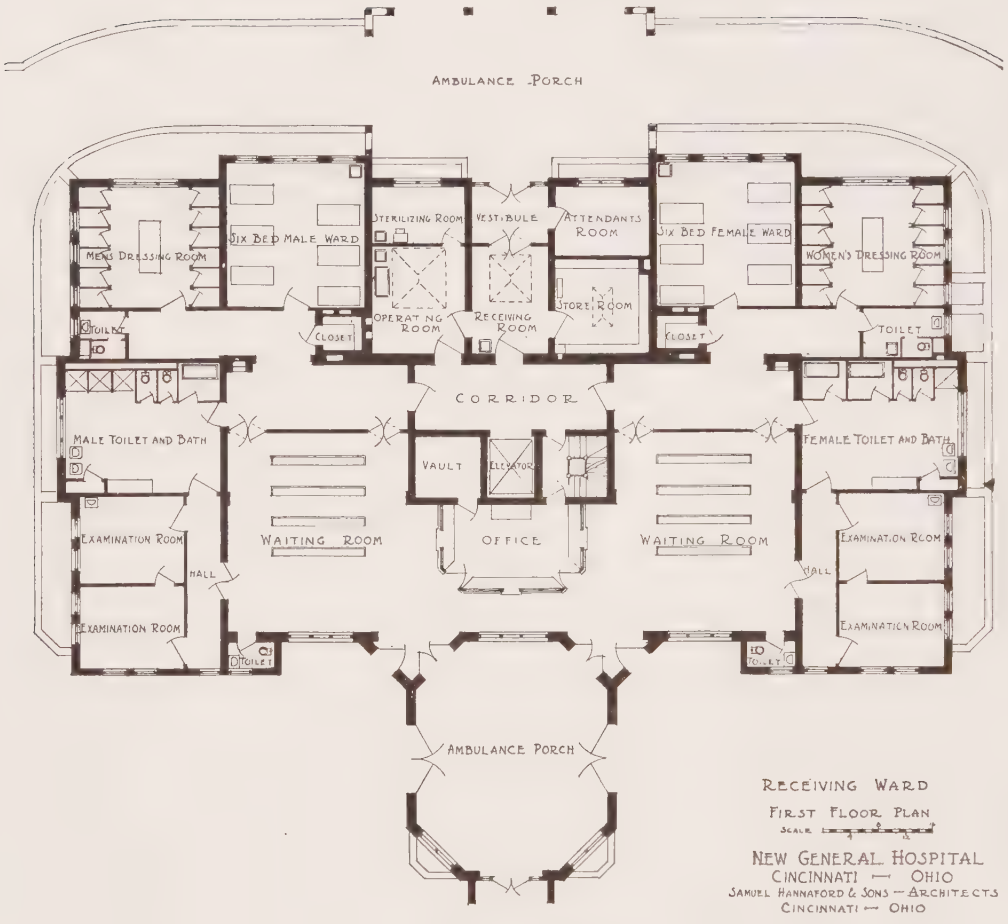

AMBULANCE PORCH
MEN'S DRESSING ROOM
SIX BED MALE WARD
STERILIZING ROOM
VESTIBULE
ATTENDANTS ROOM
SIX BED FEMALE WARD
WOMEN'S DRESSING ROOM
TOILET
CLOSET
OPERATING ROOM
RECEIVING ROOM
STORE ROOM
CLOSET
TOILET
CORRIDOR
MALE TOILET AND BATH
VAULT
ELEVATOR
FEMALE TOILET AND BATH
EXAMINATION ROOM
WAITING ROOM
OFFICE
WAITING ROOM
EXAMINATION ROOM
HALL
HALL
EXAMINATION ROOM
EXAMINATION ROOM
TOILET
TOILET
AMBULANCE PORCH
RECEIVING WARD
FIRST FLOOR PLAN
SCALE
NEW GENERAL HOSPITAL
CINCINNATI — OHIO
SAMUEL HANNAFORD & SONS — ARCHITECTS
CINCINNATI — OHIO

FIG. 32.

CHAPTER III.

The Ward Unit

The subject of the ward unit has been discussed by so many able writers on hospital planning that one hesitates to say more on the topic; still, the ward unit is really the keynote of the hospital, since it is here that the patient for whom the institution is built, lives, eats, sleeps, and spends his weary hours of convalescence. We should, therefore, never cease to study the best methods of filling those hours with as much comfort as possible; how to serve him with palatable food; how to provide him with fresh air and sunshine; and how to guard him from undue noise and from the excitement caused by the workings of the hospital.

The planning of the ward unit, whether in a hospital of one hundred or one thousand beds, presents the same problem—*how best to care for the patient*. After more or less careful study of hospital buildings in Europe and America, after consultation with many of the leading hospital authorities, and after living in the hospital and seeing the operation and treatment, it appears to the writer that there are certain fundamentals which every ward unit should possess—i.e., every ward unit of a general hospital where the surgical, the usual medical, and special cases are treated, or where the general run of cases are cared for. These essentials of planning can be classed under two heads:

(a) *Comfort of Patients.* The comfort and care of the patients are invariably the first things to be considered. Around this center—*the patient*—we build our institution. If the supplying of more light, better air, and freedom from disturbing noises will add to the comfort and hasten the convalescence of the patient, then these things must be provided.

(b) *Accessibility of Service.* The utility rooms should be so near and so well equipped that the patient need not be called upon to wait for service. At the same time, these service rooms should be so planned that the necessary noises therefrom will not be a menace to speedy convalescence.

Proportions.—From a careful investigation of modern ward units for the care of general cases—of eighteen to twenty-four beds per floor—it has been found that an average of twenty-five per cent of the area of a floor is needed for staircases, elevators, and utilities, and twenty-five per cent for corridors, leaving fifty per cent for patients. Circumstances will, of course, change this proportion. In contagious wards the proportion for utilities will be greater, while in those for incipient tuberculosis it will be less.

The ward unit should be planned for the *particular class of disease* which is to be treated in it. The conditions which govern the treatment of acute surgical patients are different from those governing chronic medical cases. The ambulatory tuberculosis patient needs different accommodations from the patient suffering with the same disease in an advanced form; the child from the adult; the contagious from the psychopathic case.

There are a few essentials applicable to all classes of cases. Whatever the case (with a possible exception of eye cases), the ward or bed of the patient should be so placed that it is possible to have *sunshine* in the room and near the bed some part of the day. All necessary inside doors and all doors or windows giving access to porches should be designed *wide enough* for the patient to be moved in his bed without any change and without any discomfort or inconvenience, to any part of the building, porches, or roof.

As to the *number of beds* to be placed in a ward, authorities differ very much and local demands vary widely. The best authorities abroad believe that not more than sixteen, or, at the most, eighteen patients should be in one room, and some think that these should be subdivided for a better segregation. The tendency is to reduce the size of wards. In

FIG. 32A. DAY ROOM—BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL, IPSWICH, MASS.
Edward F. Stevens, Architect.

this country there is an increasing demand for small wards, containing only a few beds. In the west and middle west, paying patients usually prefer private rooms, no matter how cramped in size.

In *wards,* every patient should have, when all windows and doors are closed, at least one thousand cubic feet of air. If we consider the height of the ceiling twelve feet, each patient should have not less than eighty-three square feet of floor space—one hundred is better. The height of the ceiling may depend upon the character of the disease being treated, but any height above twelve feet is unnecessary and is of little use in the purification of the air, since the breathing line is about three feet from the floor. On the other hand, for appearance's sake, a ward of more than ten beds should not be less than ten feet in height. The windows should be placed low enough so that a patient either in bed or in a chair can comfortably see the street or grounds.

Where wards are of any considerable size, there should be provided nearby one or more *"quiet" rooms* for delirious or dying patients. Delirious patients may be protected by furnishing simple iron grilles which can be shifted from one window to another.

Every patient should have at least semi-privacy and some place in which to hide the "household gods" which he may have brought with him.

Many of our modern hospitals, for economy's sake, have a flat *roof;* and some of them use this roof to a limited extent for the care and treatment of patients. These flat roofs should be used not only for observation, but, if partly covered for protection from storms and intense heat and partly open to the direct rays of the sun, a patient may be given

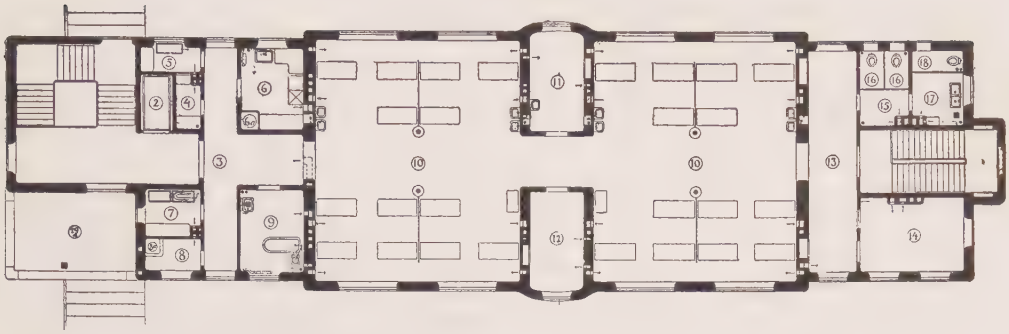


FIG. 33. WARD UNIT, RIGS HOSPITAL, COPENHAGEN, DENMARK

open-air treatment. The regular ward service of toilet, sink room, serving kitchen, and linen and supply room should be provided here.

In Europe the *day room* or convalescent room is considered by the Government so important that every hospital is compelled to provide one for each ward or group of private rooms, allowing a little over nine square feet for each patient, thus making the area of the day room about one-tenth that of the ward or group of private rooms. In some institutions this room is used for a dining-room. The day room for wards allows a separation of the convalescing patient and the really sick patient, to the advantage of each. The day room for private rooms affords a sitting room where the patients can receive their friends, gossip one with another, and get away from the monotony of their own rooms.

Every ward unit, or section of private rooms, should have a *serving kitchen* of sufficient size, so placed as to allow quick serice of palatable food. The common faults of serving kitchens are that they are too small, and that the arrangement of the equipment is inconvenient. Such rooms should be carefully planned around the equipment, instead of the equipment being adapted to the room after the building is done. The things most used should be located so as to be most accessible; and the things which are needed together should be adjacent, in order to save time and confusion. There should be facilities for keeping food either hot or cold; for cooking small diets; for laying trays for patients, and for washing the china. (See Chapter XVIII, on "Equipment.")

It is always necessary to have a separate *utility room* for the emptying, sterilizing, and storage of bed pans and urinals, and such service. The soiled clothes'

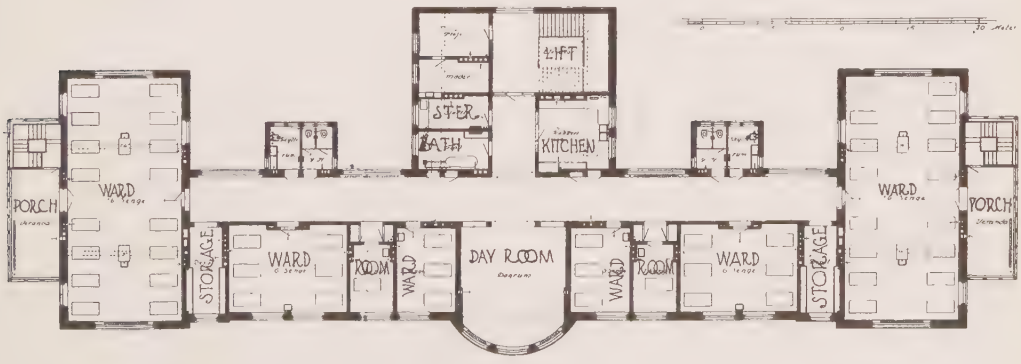


FIG. 34. WARD UNIT, BISPEBJERG HOSPITAL, COPENHAGEN, DENMARK.
M. Nyrop, Architect.

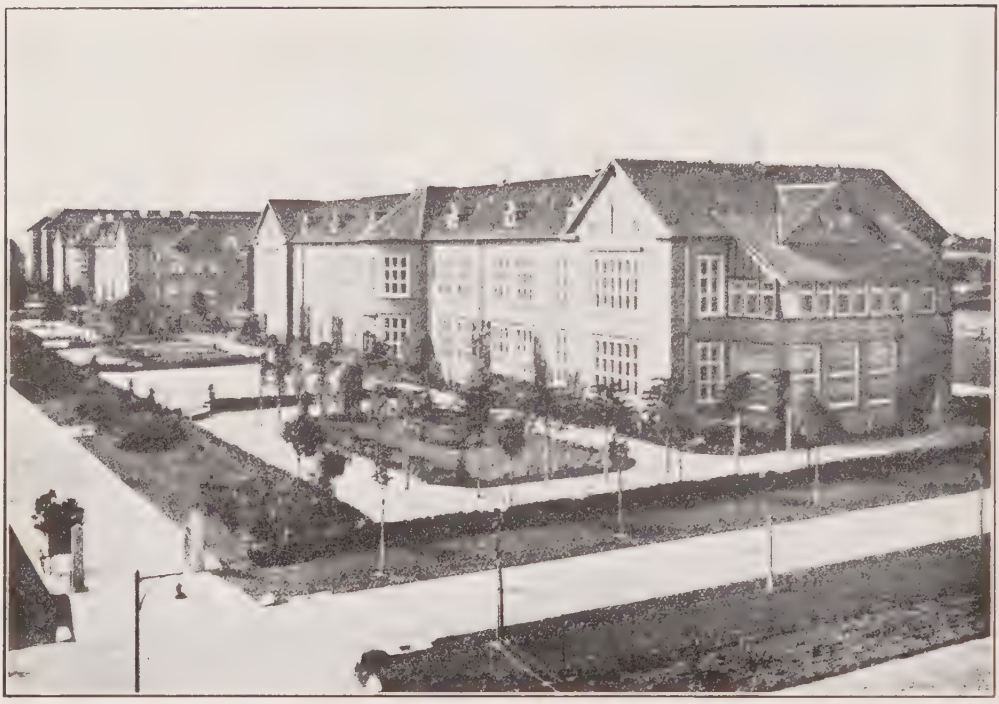


FIG. 35. EXTERIOR OF WARD BUILDING, BISPEBJERG HOSPITAL, COPENHAGEN, DENMARK.
M. Nyrop, Architect.

FIG. 36. INTERIOR OF WARD, BISPEBJERG HOSPITAL, COPENHAGEN, DENMARK.
M. Nyrop, Architect.

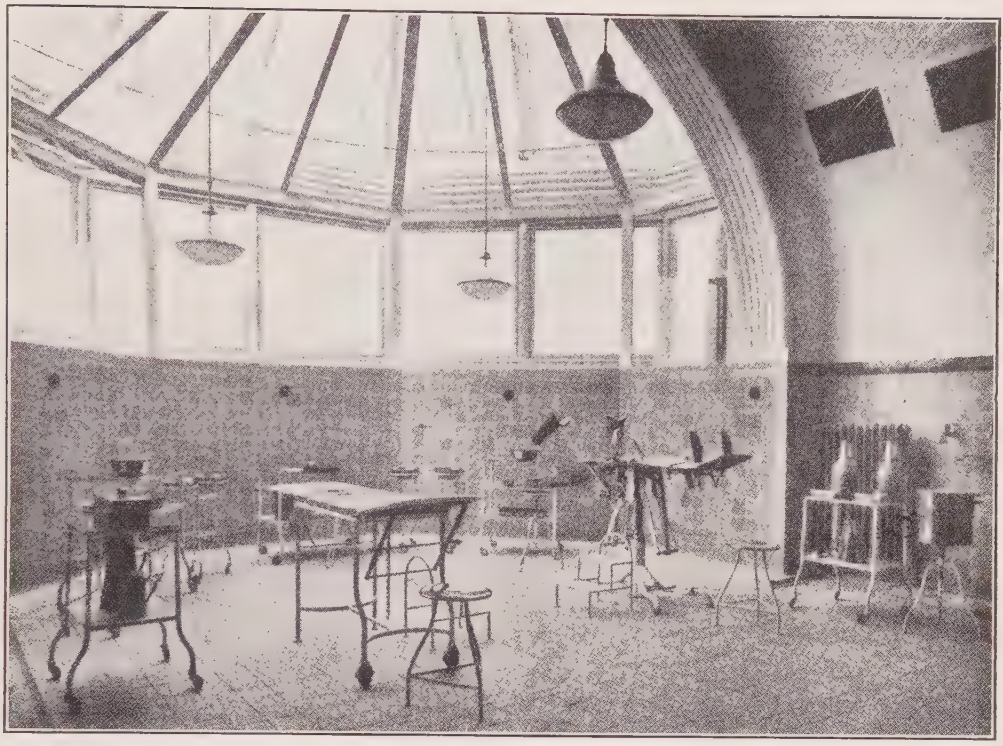


FIG. 37. OPERATING ROOM, BISPEBJERG HOSPITAL, COPENHAGEN, DENMARK.
M. Nyrop, Architect.

container may be placed here, unless a clothes' chute is used. Here, also, should be the gas stove for the making of poultices, the sterilizer for boiling instruments (unless special surgical dressing rooms are provided), the ice-crusher, the small ice storage box, the blanket warmer, etc. A local incinerator is sometimes found valuable for destroying ward waste, and can be placed in this room.

The utility room and the serving kitchen, on account of their constant use, should have the walls tiled to at least four feet in height, and should be located so as to minimize annoyance from noises.

Baths. With acute cases little use is made of the bath tub, so that in a general surgical or medical ward only a limited number is needed, one to fifteen or twenty patients.

In tubercular wards, simple bathing facilities should be provided, both tub and shower, since bathing usually forms a part of the treatment.

For departments where patients need assistance in taking their baths, the tub should be set high above the floor. It should be placed so as to be accessible from both sides. There should be room for a wheel chair.

In children's wards where the bath is always given by a nurse, the high, shallow slab or tub, with spray, should be used. For the ward entrance bath, a similar tub has been found satisfactory. (See Fig. 392 in Chapter XVI.)

Small *medicine closets* should be provided in each service. These should have a small sink, and shelves sufficient for the ordinary supply of medicines. (See Fig. 414.)

The *linen closet* should be well ventilated and lighted. Slat shelves insure better aired linen. (See Fig. 415.)

Where there are large wards, the *patients' clothing* can be better cared for in a general clothing room. For small wards or private rooms built-in cabinets or cup-

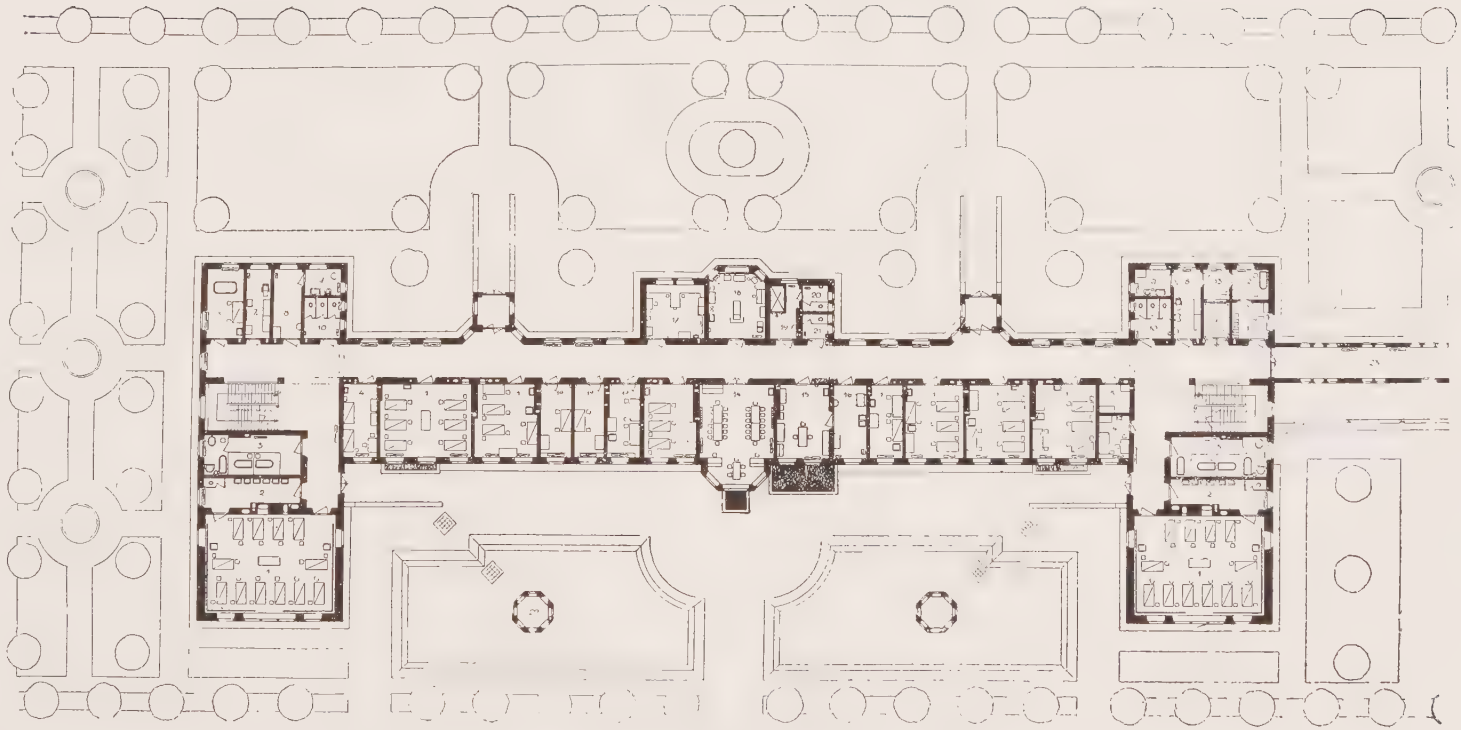


FIG. 38. PLAN OF WARD UNIT, MUNICH-SCHWABING HOSPITAL, MUNICH.
Richard Schachner, Architect.

1. Ward. 1a. Isolation Ward. 2. Lavatory. 3. Patients' Bath Room. 4. Waiting Room. 5. Utensil Room. 6. Continuous Bath. 7. Store Room. 8. Utensil Room. 9. Bed-pan Sink Room. 10. Watercloset. 11. Disrobing Room. 12. Receiving Bath. 13. Dressing Room. 14. Day Room. 15. Nurses' Office. 16. Serving Kitchen. 17. Laboratory. 18. Examination Room. 19. Lift. 20. Nurses' Toilet. 21. Orderlies' Toilet. 22. Fresh Air Intake. 23. Connecting Corridor

boards are desirable. The room vents can be carried through this closet. (See Fig. 387.)

In buildings or sections for private patients there should be a *dressing* and *locker room for special nurses.*

The necessary *toilets* must be provided. A small *laboratory* is a great convenience. For surgical wards, a properly equipped *surgical dressing room* is almost a necessity; it saves much dirt and many odors in the ward, and adds to the comfort of other patients. In the *Geisinger Memorial Hospital,* Danville, Pa. (Fig. 57), there is a room for preparation and storage of dressings, instruments and supplies, and for surgeons' scrub-up, etc., though the actual dressings are done in the patients' rooms.

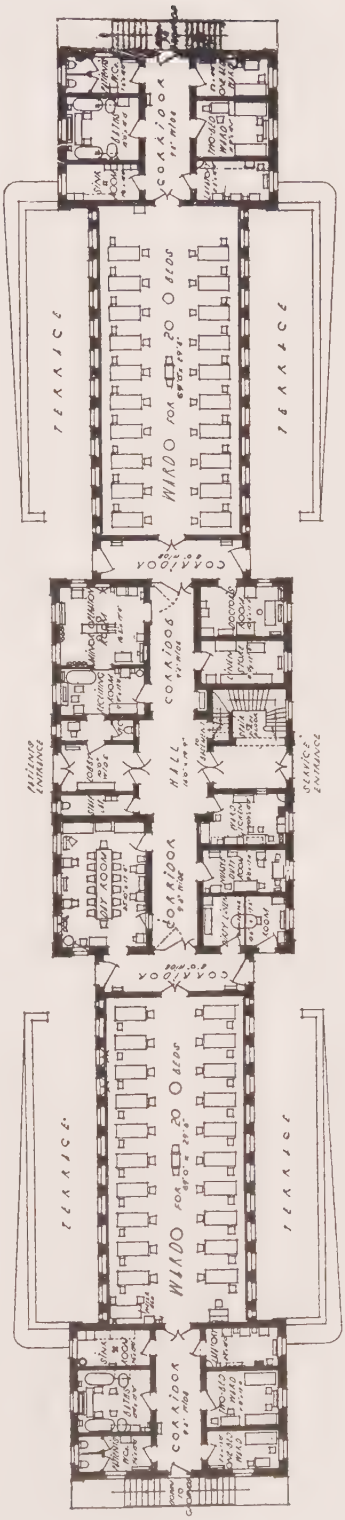
Where there are many private patients, there should be a small room with sink where *cut flowers* can be taken at night and rearranged in the morning; this prevents the clutter which one finds in the bath or sink room on morning rounds.

For the convenience of doctors and attendants, *lavatories* should be placed in every room or in the corridors adjoining. *Drinking fountains,* preferably of the "bubbling" type, add to the comfort of both patient and nurse.

Noises.—There is nothing more disturbing to a sick patient than street noises, the ringing of electric bells, the clatter of dishes, clicking of doors, hum of conversation, the flushing of plumbing, etc. He wants quiet and grumbles if it is denied. The minimizing of hospital noises is one of the architect's problems. It cannot be accomplished by putting legends on the wall, warning the visitor, doctor, or nurse to "keep silence." It must be done by planning. With modern fireproof construction, hard-plaster finish, lack of draperies, and necessary elimination of architectural detail the very walls become sounding boards, which transmit and magnify noises throughout the building.

Hospitals should be so planned that noises are confined, as far as possible, to the localities in which they originate.

Much elevator and staircase noise can be avoided if these are enclosed in one shaft, away from wards or private rooms,



GROUND PLAN

FIG. 39. WARD UNIT, RUDOLPH VIRCHOW HOSPITAL, BERLIN, GERMANY.

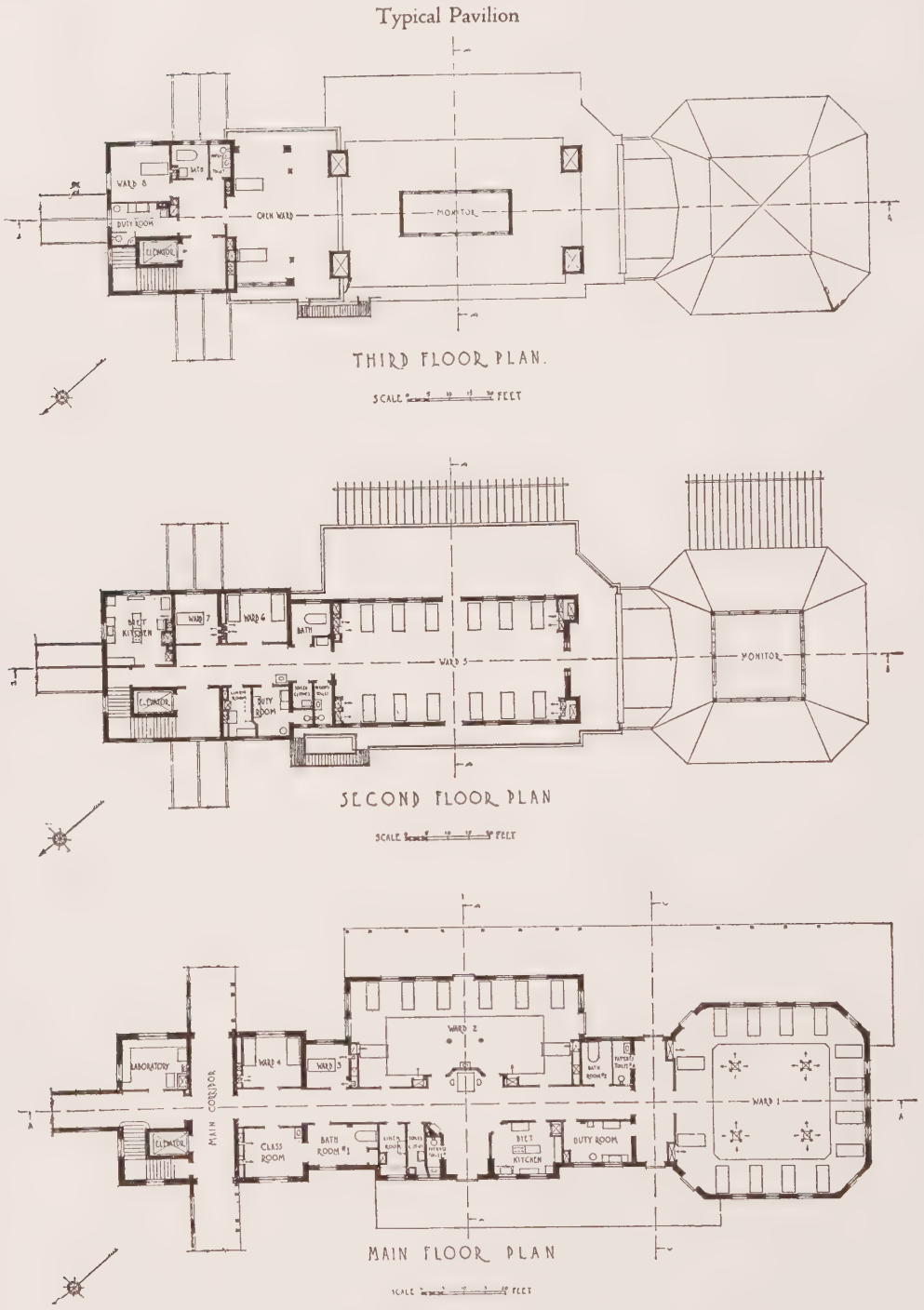


FIG. 40. WARD UNIT, PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.
Codman & Despradelle, Architects.

FIG. 41. INTERIOR OF WARD 1, PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.
Codman & Despradelle, Architects.

FIG. 42. INTERIOR OF WARD 2, PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.

FIG. 43. AIRING BALCONY, PETER BENT BRIGHAM HOSPITAL, BOSTON, MASS.
Codman & Despradelle, Architects.

with a wide landing in front, shut off from the main corridor by a door.

In a well-planned private house, the kitchen is never connected with the living rooms nor directly even with the dining-room; yet in modern hospitals we sometimes find the serving kitchen next to or directly opposite a patient's room or ward, with the clatter of dishes disturbing him many times a day. This is also quite true with other utility rooms such as sink room or public toilets. If these utilities can be segregated, placed at the end, the center, or even around the corner of the ward building, there will be much greater freedom from these disturbing noises.

In maternity departments, the nursery, the delivery room, and the labor room should be as far as possible from patients' rooms, and should be isolated by at least

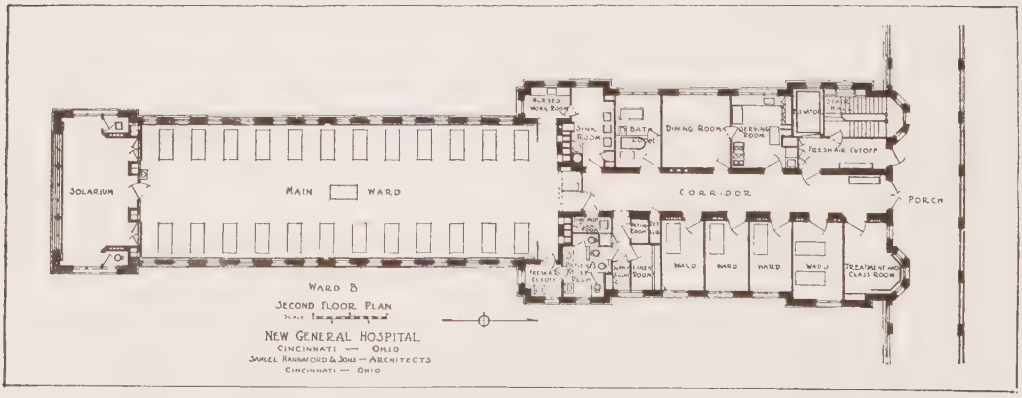


FIG. 44. WARD UNIT PLAN, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

FIG. 45. INTERIOR OF WARD, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

two intermediate doors. (See Chapter VI, on "Maternity Department.") It should be remembered that open windows in warm weather readily transmit noises; hence the importance of *location*.

The operating department should be well removed from all others, preferably on a separate floor or in a separate pavilion.

Floors which minimize the noise, either of cork or linoleum, should be used in the sick rooms; noiseless hardware and door checks to prevent slamming, etc., should be considered in the construction of the building.

Outside noises, such as street cars, railroads, traffic on the pavement, manufacturing plants in the vicinity, etc., can be avoided only by proper location. This should receive serious consideration.

A few examples of both the European and the American ward units will serve to illustrate some of the important points.

EUROPEAN WARD UNITS.

In the *Barmbeck Hospital,* Hamburg, Germany (Fig. 6), the largest ward is sixteen beds; from each ward is a *liegehalle* or airing balcony; each ward has its *tageraum* or day room; the serving kitchen, sink rooms, and toilets are removed from the vicinity of the patients' rooms; and each ward unit has a laboratory and a surgical dressing room. This ward building proper is two stories in height, with room on the third floor for a few nurses for quick call.

The operating building of this hospital of fifteen hundred beds has but two operating rooms, so that many of the minor surgical procedures are done in the surgical dressing rooms which are in each unit. The Barmbeck unit is an unusually good and complete one.

The Rigs Hospital, Copenhagen, Denmark, Ward Unit* (Fig. 33), has much to commend it worthy of study, for it is in many ways unique. The staircase, elevator, and other noisy equipment are kept at the extreme ends, away from the portion of the building occupied by

*When the scale is not placed on a plan, the size of the rooms can be estimated by noting the size of the beds, which are usually 3 ft. by 6 ft. 6 in.

FIG. 46. FRONT, WARD BUILDINGS, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

FIG. 47. REAR, WARD BUILDINGS, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

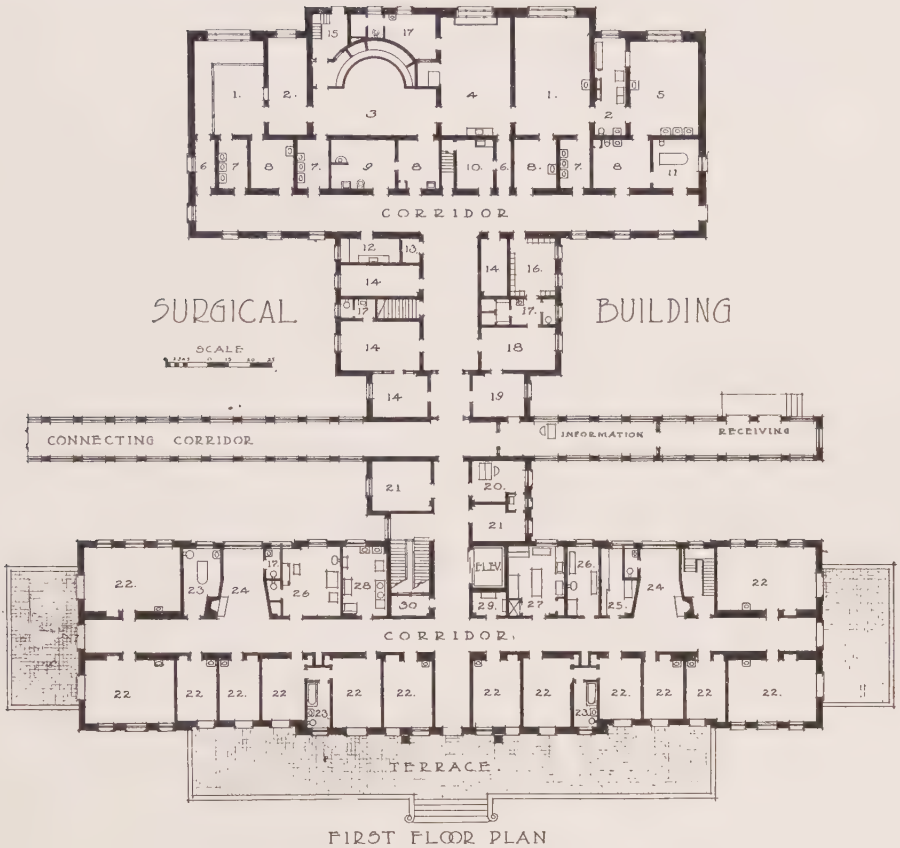


FIG. 48.

1. Operating Room. 2. Sterilizing Room. 3. Operating Amphitheater. 4. Nurses' Work Room. 5. Emergency Operating Room. 6. Passage. 7. Doctors' Wash Room. 8. Anesthetizing Room. 9. Dark Operating Room. 10. Utility Room. 11. Emergency Receiving Room. 12. Laboratory. 13. Doctors' Phone. 14. Doctors' Offices. 15. Rear Entrance. 16. Doctors' Locker Room. 17. Toilet Room. 18. Waiting Room. 19. Accounting Room. 20. Phone Exchange. 21. Office. 22. Private Room. 23. Bath. 24. Alcove. 25. Linen. 26. Utility. 27. Diet Kitchen. 28. Dressing Room. 29. Head Nurse. 30. Doctors' Phone.

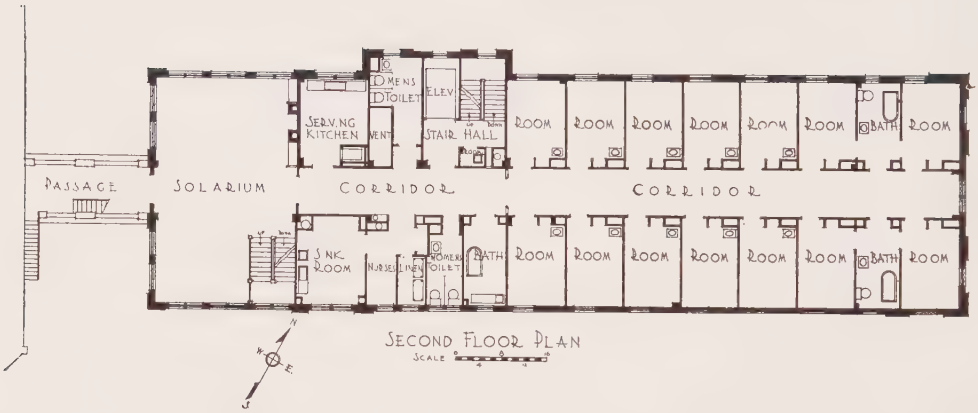


FIG. 49. PRIVATE PAVILION, HAMOT HOSPITAL, ERIE, PENN.
Edward F. Stevens, Architect. C. Paxton Cady, Associate.

patients. The serving kitchen, bath and sink rooms are on a cross corridor; the surgical dressing rooms and toilets are at the opposite end of the building. An isolation room and nurses' room are placed in the center.

The ward itself, containing twenty-six beds, is divided into eight sections, each section containing three or four beds. A dividing screen affords privacy to the patients and still allows free access to all parts of the room for the attendants. The screens, only six feet high and raised one foot from the floor, afford the same ventilation as an open ward. Bowls for surgeons' use and medicine closets are placed in each ward.

This is doubtless one of the best developed ward units in Europe.

In the *Bispebjerg Hospital,* Copenhagen, Denmark (Fig. 34), the war unit is interesting, sixteen beds being the largest ward. The details of the various equipment was very carefully devised.

In the *Munich-Schwabing* (Fig. 38) unit the largest ward is twelve beds. All wards face the south and have opportunities for wheeling patients into the balconies and into the gardens. The balconies are spacious and comfortable with attractive boxes of flowers decorating them in summer. The service rooms are to the north, also the laboratory and dressing rooms. The day room is to the south, central with the unit.

The admitting department for each ward unit is very complete. The patient comes into room No. 11; his clothes are

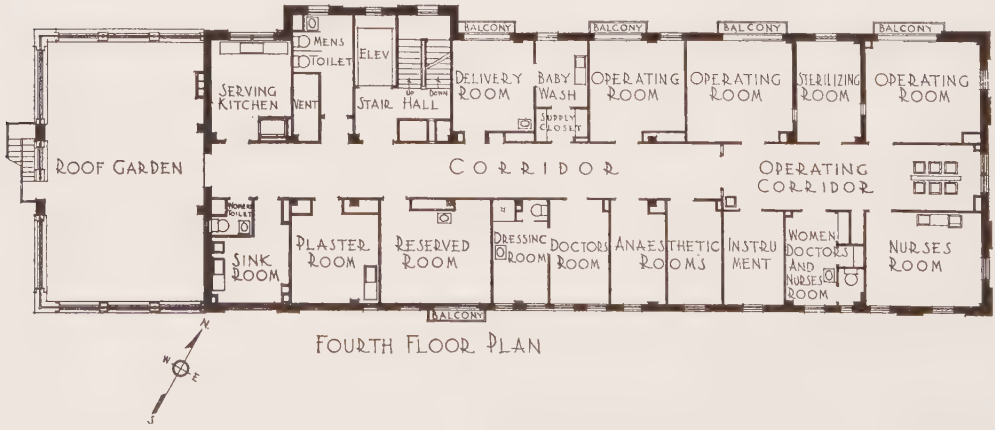


FIG. 50. PRIVATE PAVILION, HAMOT HOSPITAL, ERIE, PENN. OPERATING DEPARTMENT.
Edward F. Stevens, Architect. C. Paxton Cady, Associate.

ADDITION TO THE HAMOT HOSPITAL
ERIE PENN
EDWARD F. STEVENS, A.I.A. BOSTON, MASS.
C. PAXTON CADY, A.I.A. ERIE, PENN.
ASSOCIATE ARCHITECTS

FIG. 51. HAMOT HOSPITAL, ERIE, PENN.
Edward F. Stevens, Architect. C. Paxton Cady, Associate.

removed and put into a container of linen which is hung on a truck; he next goes to room No. 12, where he is bathed; to No. 13, where he is given hospital clothes; passes to No. 8, where final examination is made and history completed, and thence to his bed. The elevator at this part of the building is for the convenience of the second-story patients.

AMERICAN WARD UNITS

The European hospitals are built and supported very largely by the governments. In this country, we have a very different condition. Many of our hospitals are private corporations, and it is generally a question of accommodating the largest number of patients for the smallest amount of money. Our architects, therefore, are often forced to economize in every way, until the wards in many cases have become almost barracks for the mere housing of people, and the attendants are obliged to put up with the scantiest accommodations.

Some of our newer hospitals are rising in scale. Instead of making a number of rooms and leaving it to the administrator to find out later what he can put into these rooms, they are allowing their architects to provide some of the more essential rooms, such as the sink room, a serving kitchen of sufficient size, a surgical dressing room, laboratory, etc.; and are letting him design and plan the equipment at the time he makes the drawings for the building.

The care and thought put by Dr. H. B. Howard, upon the working out of the plan of the *Peter Bent Brigham Hospital*, Boston (Figs. 40-42), make it worthy of attention.

The first floor of the ward unit contains two large wards, one of eight and the other of fourteen beds. A cross corridor separates the two wards. Two iso-

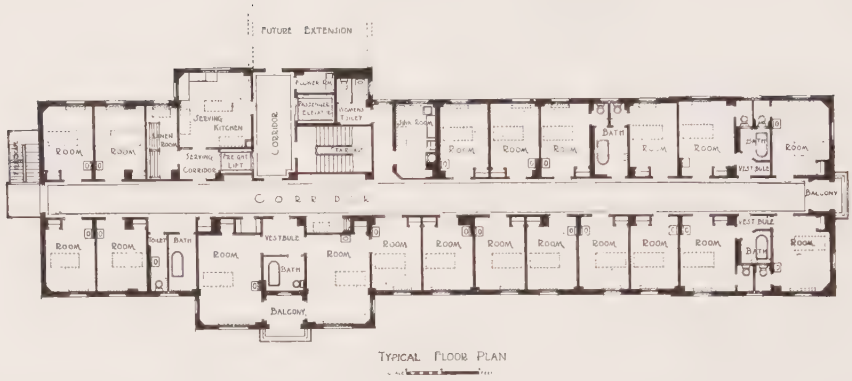


FIG. 52. PRIVATE PAVILION, BUFFALO GENERAL HOSPITAL, BUFFALO, NEW YORK.
Edward F. Stevens, Architect.

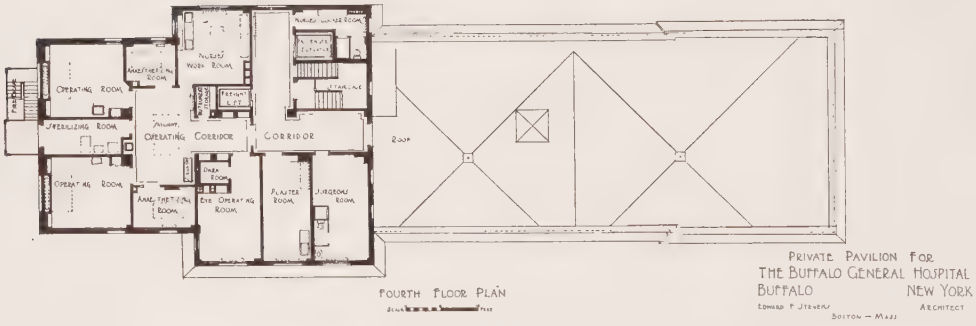


FIG. 53.

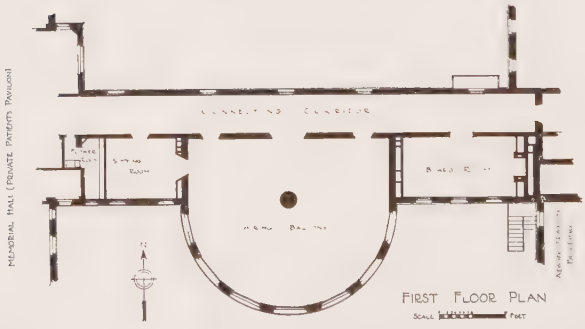


FIG. 53A. CONNECTING CORRIDOR AND AIRING BALCONY BETWEEN THE PRIVATE PATIENTS' BUILDING AND ADMINISTRATION BUILDING—BUFFALO GENERAL HOSPITAL, BUFFALO, N. Y.
Edward F. Stevens, Architect.

FIG. 54. EXTERIOR PRIVATE PAVILION—BUFFALO GENERAL HOSPITAL, BUFFALO, N. Y.
Edward F. Stevens, Architect.

lation rooms, with diet kitchen, duty room, baths and toilets, are grouped together on the side of the corridor opposite the main ward. There are, also, a laboratory and a consultation room on this floor.

The staircase and elevator lead directly from the main corridor at the extreme north end of the building.

In the second story there is one large ward of twelve beds, two isolation rooms, duty and toilet rooms. Ample airing balconies or terraces on both floors provide outdoor space for all the patients of this unit.

The portion of the building containing the octagonal ward (Fig. 41) is but one story in height, and has monitor windows. The main ward, second story (Fig. 42), is also top-lighted.

On the third floor (Fig. 40), there is an open-air ward, with the necessary duty room, toilet, and isolation rooms. This can also be used for contagious cases which may develop in the hospital.

The *Cincinnati General Hospital* shows the influence of European examples. The late Dr. Holmes gave much thought to the perfecting of this ward unit (Figs. 44-47).

In this ward unit the nurses' station, while not directly in the main ward, is in such a position that it commands a view of all the ward beds, as well as the doors of the private rooms.

The patients' toilet is entered through a fresh-air cut-off, after the manner of the best-planned English hospitals. The sink room is entered either through the nurses' work room or directly from the corridor. There are additional toilet facilities connected with the solarium, thus minimizing the work of nurses or attendants.

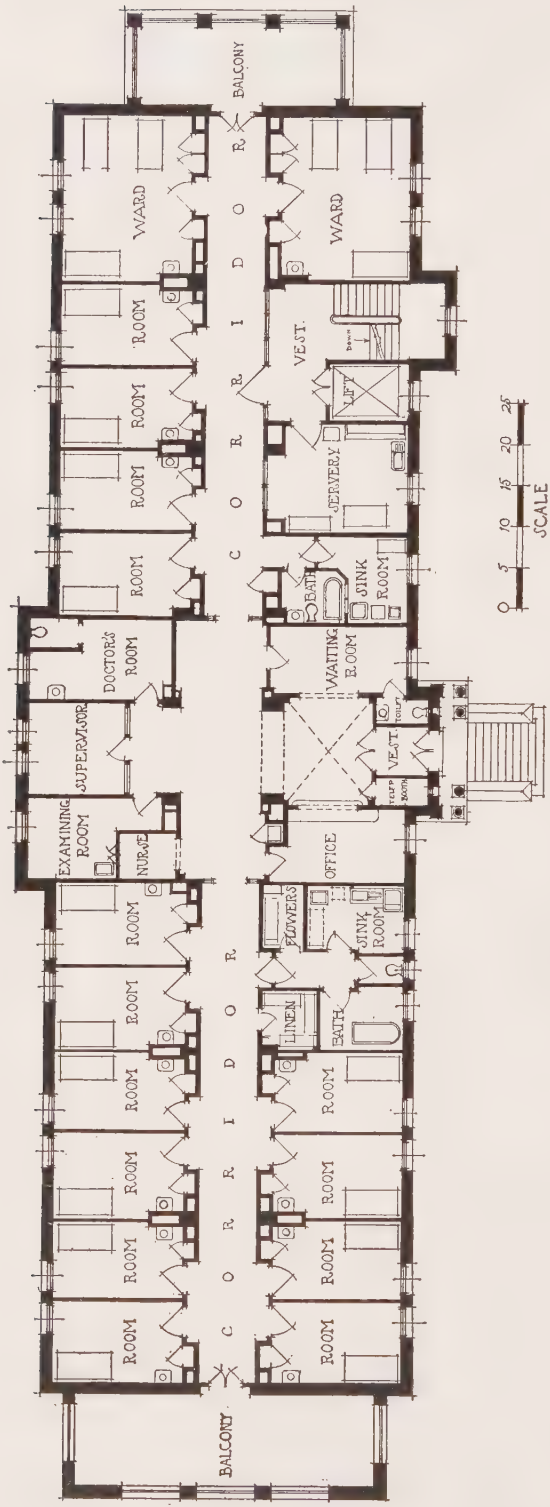


FIG. 55. PRIVATE PAVILION—VICTORIA GENERAL HOSPITAL, HALIFAX, N. S.
Stevens & Lee, Architects.

FIG. 56. SECOND FLOOR PLAN, PRIVATE PAVILION—VICTORIA GENERAL HOSPITAL, HALIFAX, N. S.
Stevens & Lee, Architects.

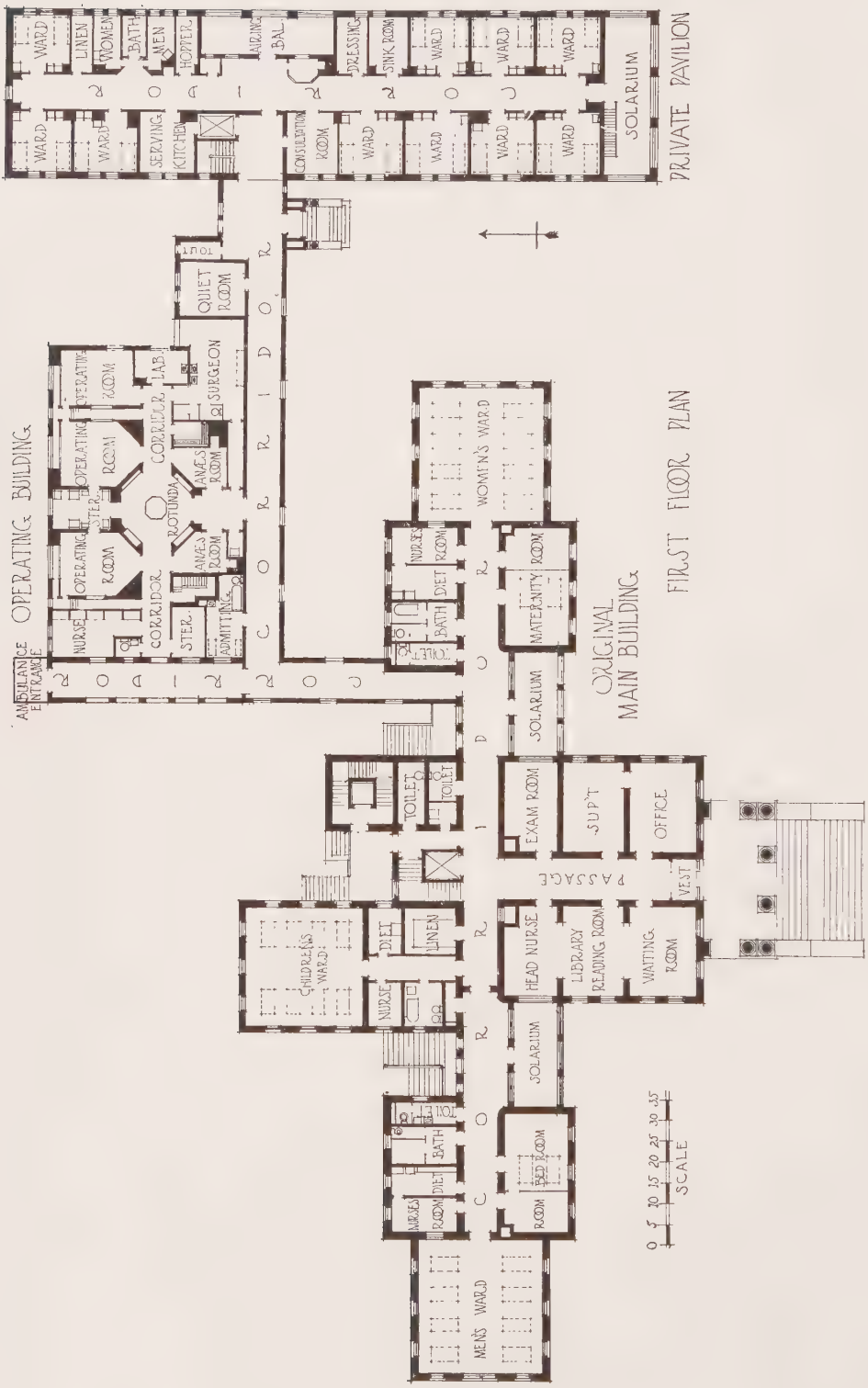


FIG. 57. THE GEORGE F. GEISINGER MEMORIAL HOSPITAL, DANVILLE, PA.
Edward F. Stevens, Architect.

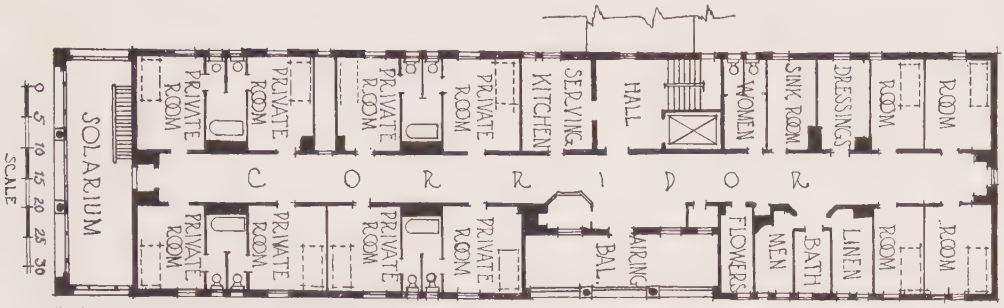


FIG. 58. SECOND FLOOR, PRIVATE PAVILION—THE GEORGE F. GEISINGER MEMORIAL HOSPITAL, DANVILLE, PA.
Edward F. Stevens, Architect.

The utilities, baths, and toilets are grouped together. The entrance to the serving kitchen is near the main stair and elevator corridor. A commodious dining room is provided for those patients who are able to be about.

In the *Henry Ford Hospital,* Detroit, Mich (Fig. 48), the ward unit provides for sixteen beds in the general ward, one two-bed ward and two single rooms. The patients' toilet is entered indirectly from the ward through a fresh air passage. There are also additional toilets, entered from the solarium or day room. The arrangement of the private ward unit and the operating building are shown in Fig. 48.

The recent addition to the *Hamot Hospital,* at Erie, Penn., consists of a seven-story fireproof building (Fig. 51) which is devoted largely to private rooms and surgical department of the hospital. This pavilion is designed as the first unit of an entirely new Hamot Hospital, but is complete in itself. In this ward unit, all the utilities are grouped at one end of the building; the stair hall and elevator are shut off from the main corridor; the sink room and serving kitchen are at the extreme end of the building. A large solarium and airing balcony are on the southwest end of the building on each floor. Fig. 49 shows a typical floor.

The private ward unit of the *Buffalo General Hospital,* Buffalo, N. Y. (Figs. 52, 53, 54), provides for suites with baths, and comfortable single rooms with a lavatory in each. The sink room and the serving kitchen open from cross corridors to avoid noise. A special room, with sink, is provided for flowers.

In the addition to the *Victoria General Hospital,* Halifax, N. S. (Figs. 55-56), the problem was to connect the new ward building with the existing service building. It could not be done through basement nor wards, but was accomplished by making a corridor through the attic of the old building and connecting it by a bridge to the third floor of the new. The lift takes food direct to the servery on each floor.

The first floor has a small office, a waiting room for visitors, a doctors' room, an examining room, and an office for the supervisor. There are two three-bed wards and fourteen private rooms, each having its own lavatory. There are two sink rooms, a flower room, ample balconies and all needed utilities. The second floor has two rooms with connecting bath and private balcony. Special features are the projecting nurses' station which gives a view of the whole floor, and the placing of the utility rooms on side corridors to obviate noise.

In the private patients' pavilion of the *George F. Geisinger Memorial Hospital,* Danville, Pa (Figs. 57, 58, 59) the first floor has ten double rooms or two-bed wards, each with two closets for clothing and its own lavatory. There is a large solarium, a large open balcony, a consultation room, a surgical dressing room, and two sink rooms, with other utilities centrally located. The second and third floors each have four sets of rooms with a communicating bath between, a surgi-

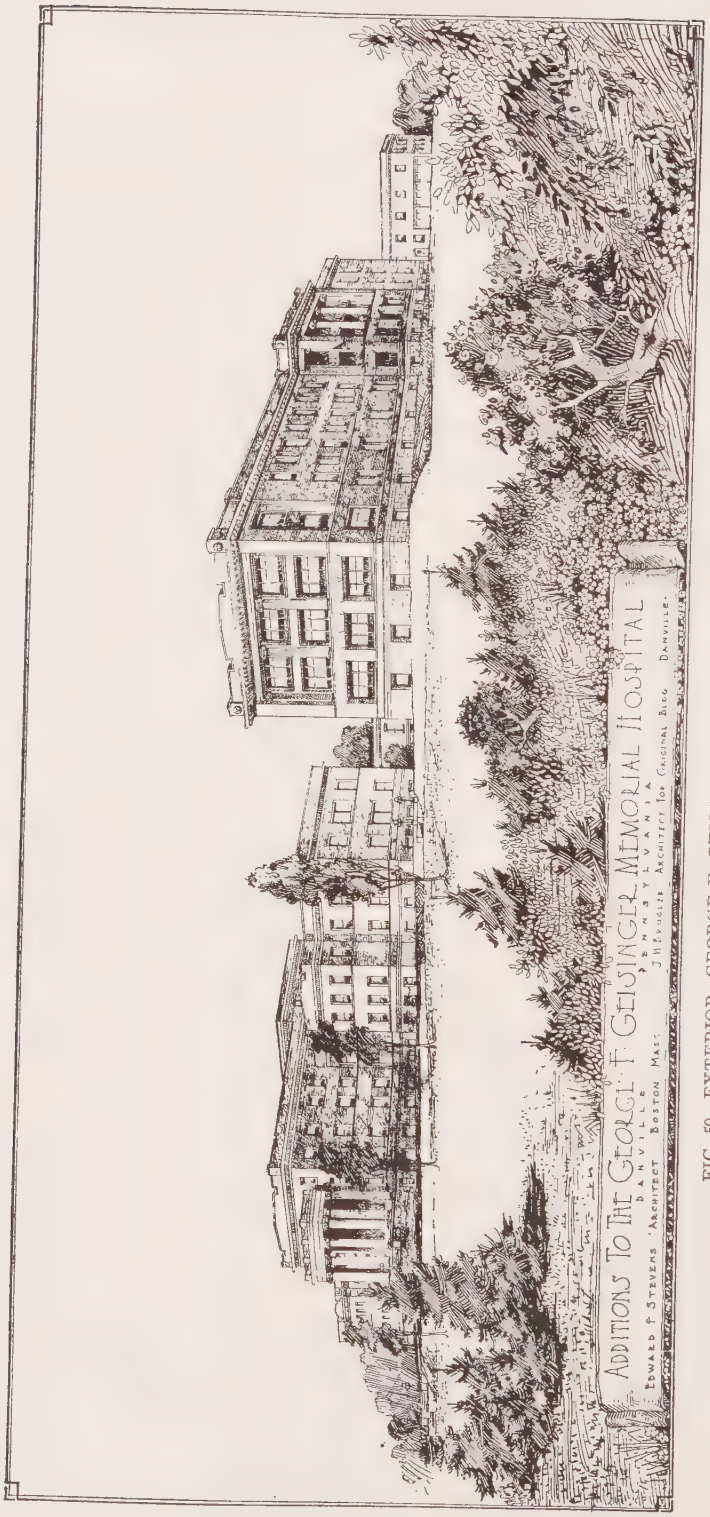

ADDITIONS TO THE GEORGE F. GEISINGER MEMORIAL HOSPITAL
DANVILLE
PENNSYLVANIA
EDWARD F. STEVENS ARCHITECT BOSTON MASS.
J.H. PRUDLER ARCHITECT FOR ORIGINAL BLDG. DANVILLE

FIG. 59. EXTERIOR—GEORGE F. GEISINGER MEMORIAL HOSPITAL, DANVILLE, PA.
Edward F. Stevens, Architect.

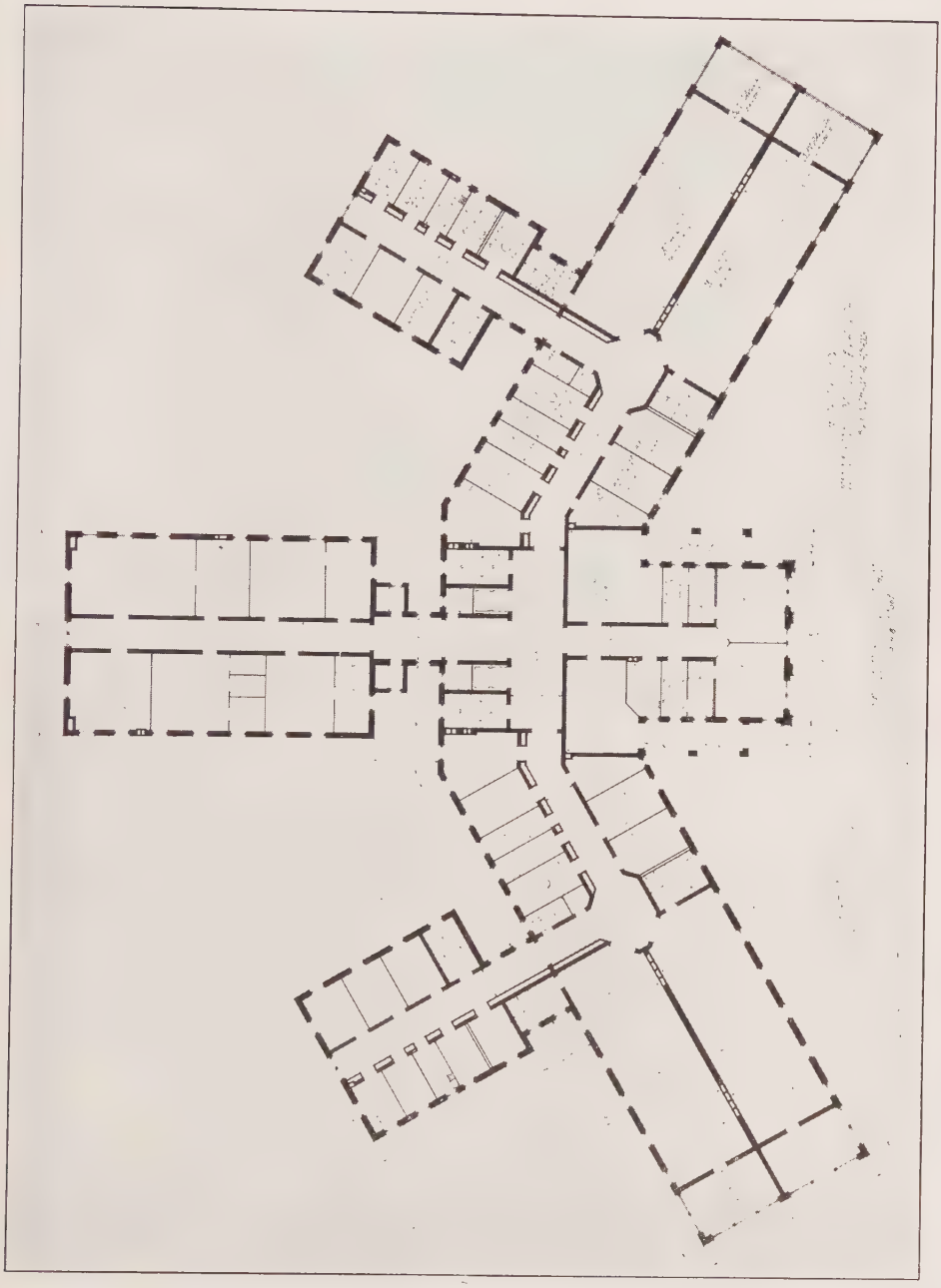


FIG. 60. TYPICAL FLOOR, TENNESSEE COAL, IRON & RAILROAD COMPANY'S HOSPITAL, BIRMINGHAM, ALA.
Gustave W. Drach, Architect.

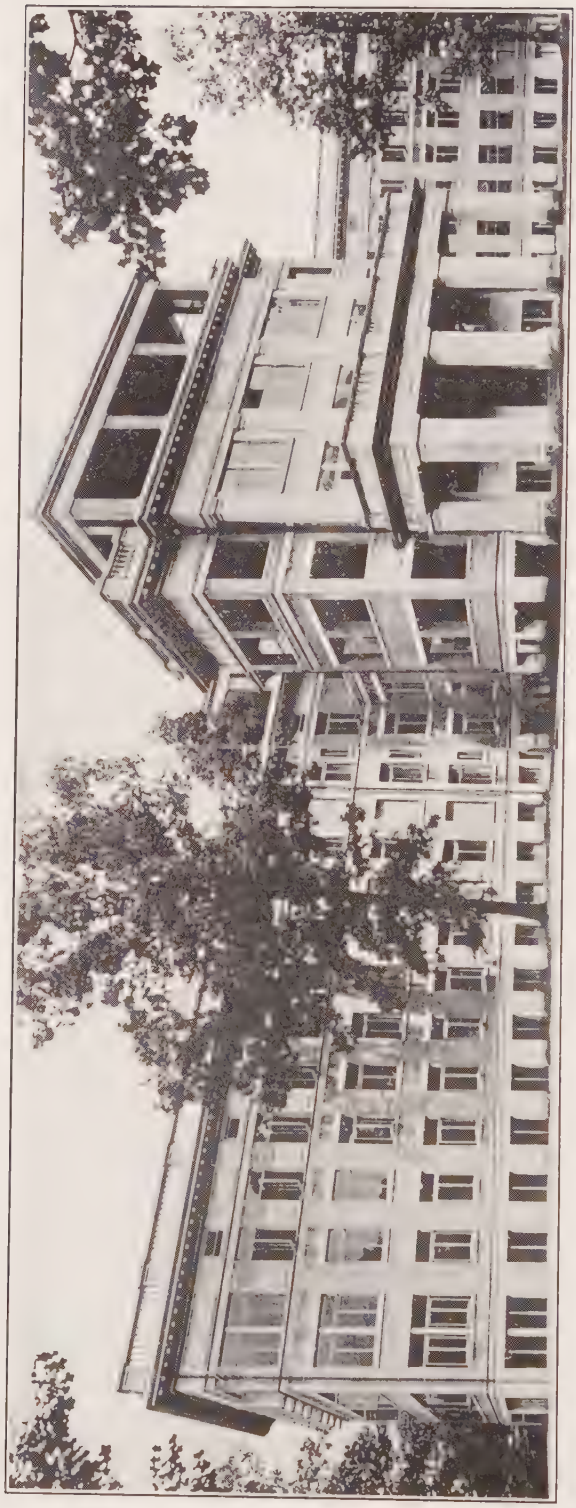


FIG. 61. HOSPITAL FOR THE TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, ALA.
Gustave W. Drach, Architect.

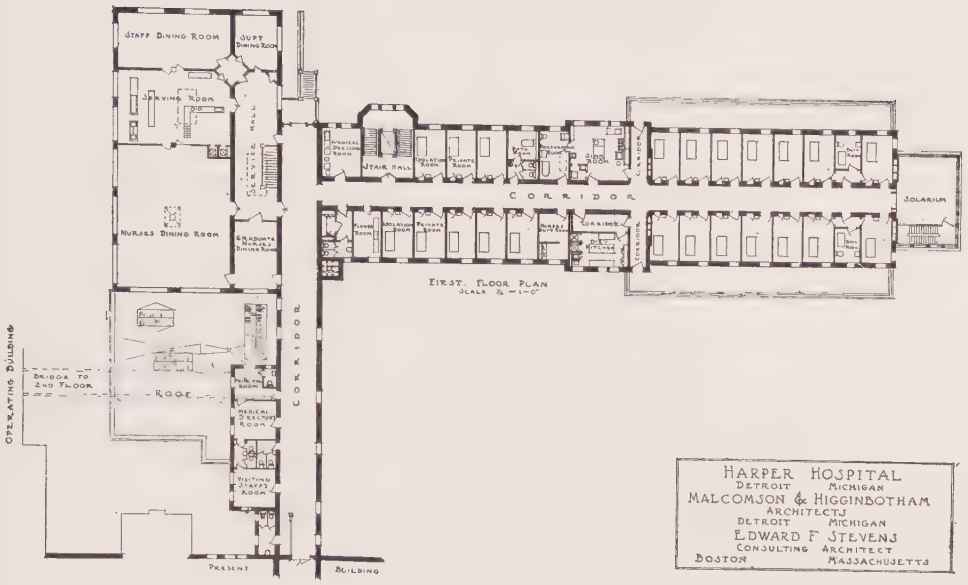


FIG. 62. HUDSON MEMORIAL BUILDING, HARPER HOSPITAL, DETROIT, MICH.
Malcomson & Higginbotham, Architects, Detroit, Mich.
Edward F. Stevens, Consulting Architect, Boston, Mass.

cal dressing room (used chiefly for preparation, storage, scrub-up, etc.), a flower room, an extra hopper room, with balconies and utilities as on the first floor.

The hospital for the *Tennessee Coal, Iron and Railroad Company* at Birmingham, Ala. (Figs. 60-61), is planned so as to secure the maximum amount of light and air. The small wings make it possible to easily isolate any special cases, such as venereal. There are both wards and private rooms with ample utilities. The operating rooms are in the central building on the third floor.

In the six-story building recently erected for the *Harper Hospital* (Figs. 62 and 63), Detroit, an innovation has been introduced into the construction by making eight-foot set-backs in the walls of the main pavilion at the fourth floor so that the first three stories provide for private rooms on either side of a wide corridor. The upper three stories provide for a ward on each of proper width for

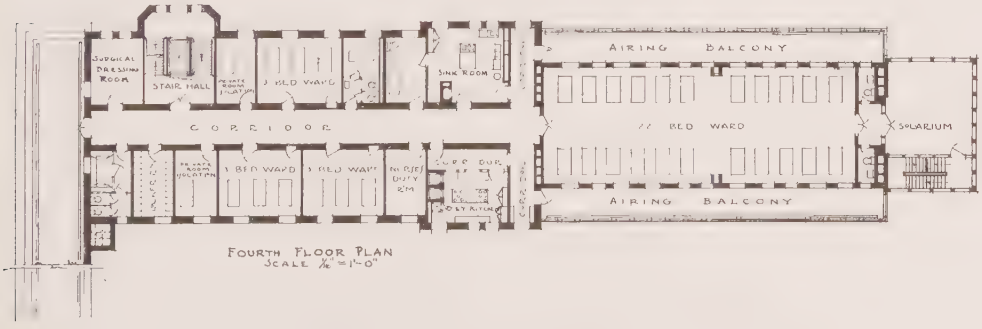
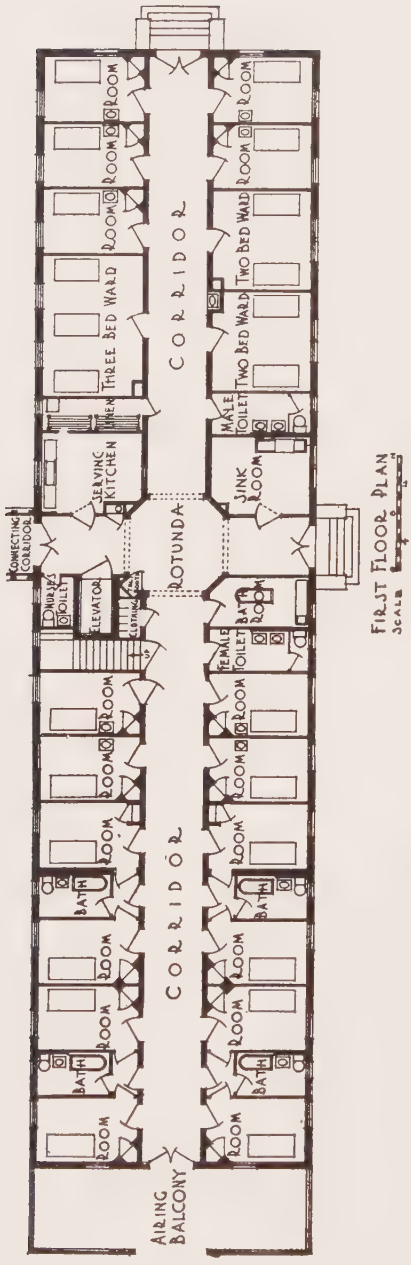


FIG. 63. HUDSON MEMORIAL BUILDING, HARPER HOSPITAL, DETROIT, MICH.
Malcomson & Higginbotham, Architects, Detroit, Mich.
Edward F. Stevens, Consulting Architect, Boston, Mass.



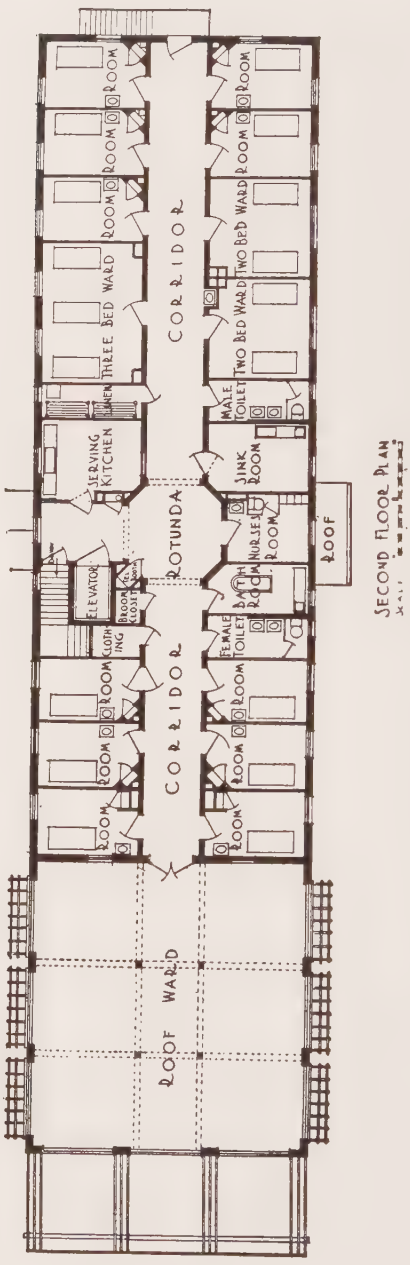


FIG. 64. PRIVATE PAVILION, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect. Mellen C. Greeley, Associate.

FIG. 65. EXTERIOR OF PRIVATE PAVILION, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect. Mellen C. Greeley, Associate.

administration. This allows for two large airing balconies on the fourth floor, over the roof of the third-story private rooms.

In this plan, also, the utilities are grouped in the center, with a fresh air cut-off between them and the main twenty-two-bed ward. At the end of the large wards toilet rooms are provided, in addition to the general toilet rooms from the main corridor.

For every story there are surgical dressing rooms, and on the private room floors a special room for cut flowers is introduced. The seventh story consists of a large roof ward, with diet kitchen and other utilities.

In the *St. Luke's Hospital,* Jacksonville, Fla., it was planned to have several public ward units (Fig. 66), accomodating thirty-six patients in each building, the largest ward containing but six beds. The entrance is from the open-air corridor at the east, and the utility rooms are grouped around this entrance, with the doors to sink room, serving kitchen, nurses' toilet, and elevator opening from the cross corridor, minimizing the noises from these disturbing elements. Two large airing balconies are provided on each floor.

In the private pavilion of the same hospital (Fig. 64) a similar arrangement is secured so far as the utilities are concerned. The units are smaller, a three-bed ward being the largest, most of the space being utilized for single rooms. In this plan, the open-air ward is introduced on the second floor, being connected with the main corridor and served from the main utility rooms. Both this building and the public ward unit are but two stories in height.

In the *Youngstown Hospital* at Youngstown, Ohio, the ward unit (Fig. 68) is not unlike some of the others described, providing for a central location of the utilities, with sufficient isolation for the rooms and wards to minimize the effect of noises upon the patients.

The first floor of this pavilion is used only for ward patients; and the second,

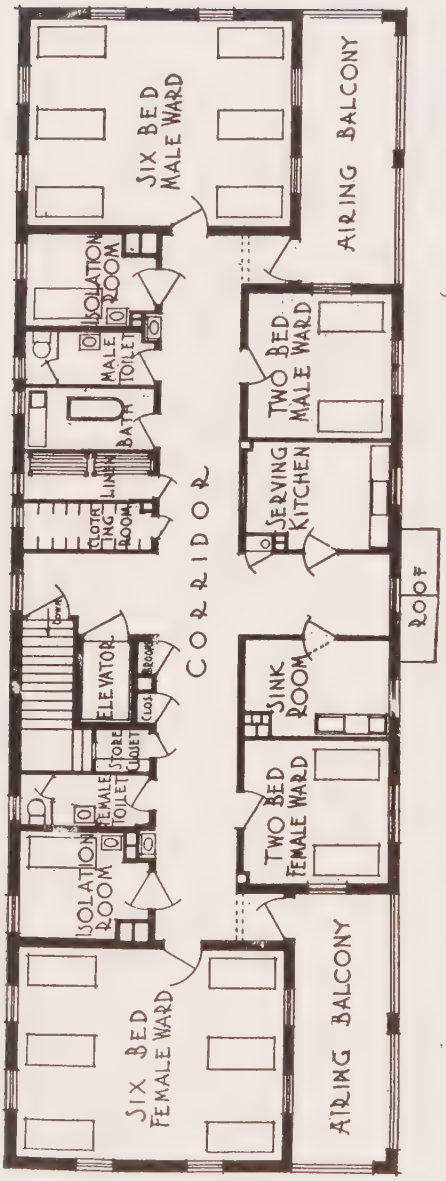


FIG. 66. PUBLIC WARD UNIT, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect. Mellen C. Greeley, Associate.

third, and fourth floors for private patients. On the north there is a day room on each floor, and a large roof ward on the fifth floor.

The ward unit used in the maternity and children's department of the *Bridgeport Hospital* at Bridgeport, Conn., is one which will apply to any general ward (Fig. 69), and is described under the chapters on maternity and children's hospitals. (See also Figs. 70-74.) This unit, designed on the Rigs Hospital ward plan, affords a better division of patients than almost any other plan of the same area. It is arranged in groups of four beds. The division between the groups is made by a permanent screen, upon which are placed the connections for the nurses' calls and the electric lights.

The utilities and quiet room are planned for the most efficient service.

GENERAL HOSPITALS

The *Galloway Memorial Hospital* at Nashville, Tenn. (Fig. 75), consists of a group of three buildings, the first one to be erected being in the center, and is composed of an operating pavilion, charity ward pavilion, and private ward pavilion.

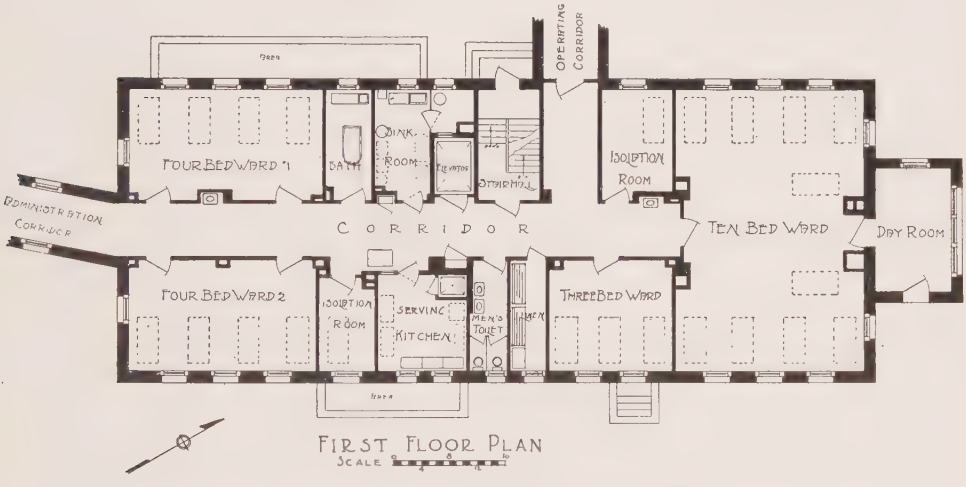
In the operating pavilion the basement floor is to be used for administrative purposes and to the rear an ambulance porch shelters patients being received. The second floor consists of the operating department, together with dressing rooms, sterilizing, anaesthetic and recovery rooms, and all other modern arrangements necessary to a thoroughly equipped operating department. The third floor is similarly fitted for a charity operating department, and is furnished in every particular with the same conveniences and advantages that the pay service will afford.

The right wing is for charity patients only. The basement floors are used for consultation, emergency beds and a free dispensary. The second and third floors hold one hundred charity beds, conveniently arranged, with one to twelve beds per room. The roof garden, to which the patients have access for fresh air and sunshine, is reached by an elevator.

In the left wing, the basement floor for the present will furnish space for kitchen, dining-rooms and domestic service. The second and third stories contain thirty-two rooms for pay service; and the fourth floor, in the form of a roof garden, furnishes outing space, sunshine and fresh air for the patients below and can be reached by means of an elevator from the wards.

In the *German Hospital* in Chicago (Figs 76 and 77), which is of the L-

FIG. 67. CORRIDOR AND PUBLIC WARD, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect. Mellen C. Greeley, Associate.



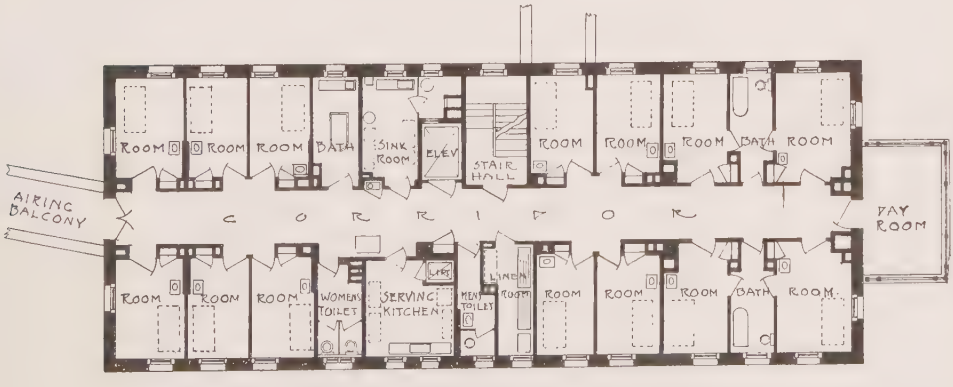


FIG. 68. TOD WING, YOUNGSTOWN HOSPITAL, YOUNGSTOWN, OHIO.
Edward F. Stevens, Architect.

shape plan, the architects have designed the private and public wards in different sections of each floor, giving an excellent chance for segregation and treatment of diseases. In the public ward portion, six-bed wards are the largest. The placing of the elevator and staircase in a separate space, and grouping about these the utility rooms, must tend to minimize disturbance from the noises. Each floor is provided with two suites, with bath and toilet connecting, so arranged, however, that the waterclosets and bowls are separated from the tub, making it possible to use the suites as private rooms. The maternity and operating departments are on the fourth floor, with proper shut-offs and segregation of the noisy portions of the maternity department.

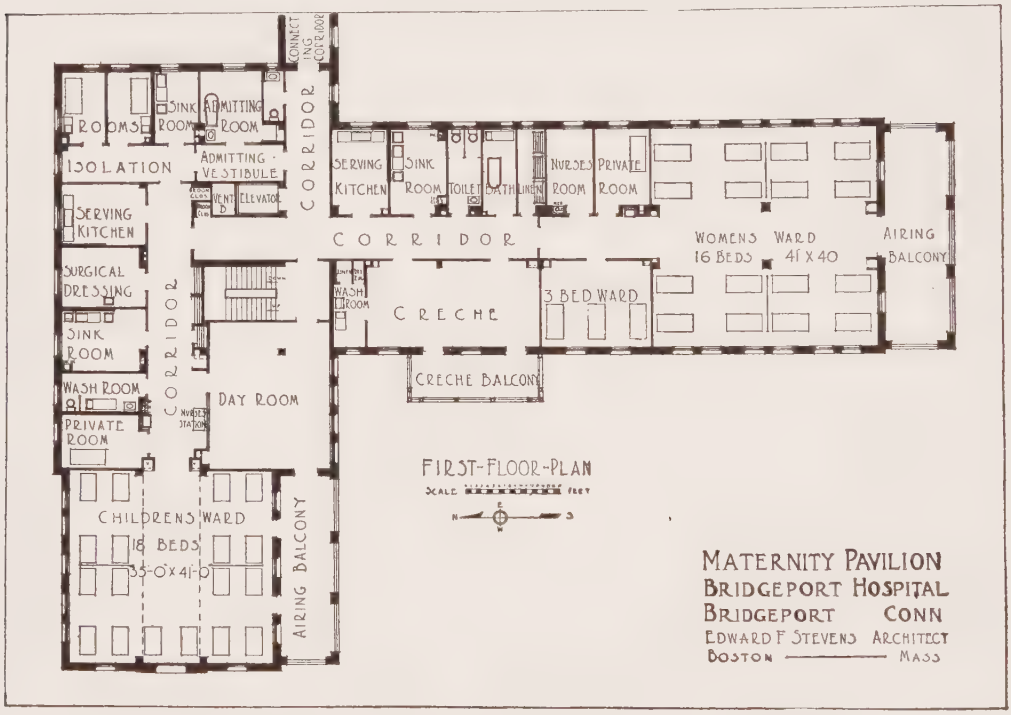


FIG. 69. MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

In the *Ottawa Civil Hospital,* Ottawa, Canada (Figs. 78-86), the H-shaped building is designed to be administered as two units, right and left. On the so-called tunnel floor there is much space allowed for storage, thus permitting supplies to be bought in quantity when market conditions are favorable.

The ground floor contains a very complete out-patient department (see Chapter XI); large locker rooms where all ward patients' clothing can be properly hung and systematically taken care of; the admitting department, already described; the Roentgen-ray, psychopathic, isolation and medical treatment departments.

In the center of the first floor is the administration, the remainder being devoted to wards. The second floor is reserved for women ward patients, 130 in all, in wards of three, five and six beds, or four-bed units in sixteen-bed wards. The five utility rooms save much time and travel for the nurses and facilitate service. Three nurses' stations command the whole area. There are two large serving kitchens, two surgical dressing rooms, and a special isolation department for venereal cases.

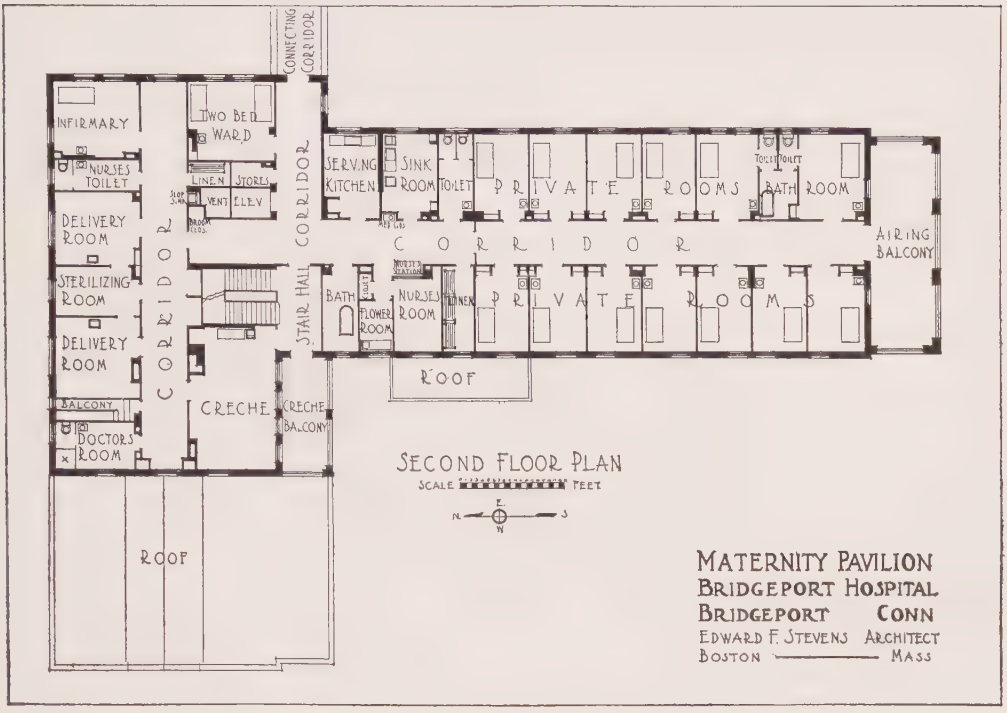


FIG. 70. MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL
Edward F. Stevens, Architect.

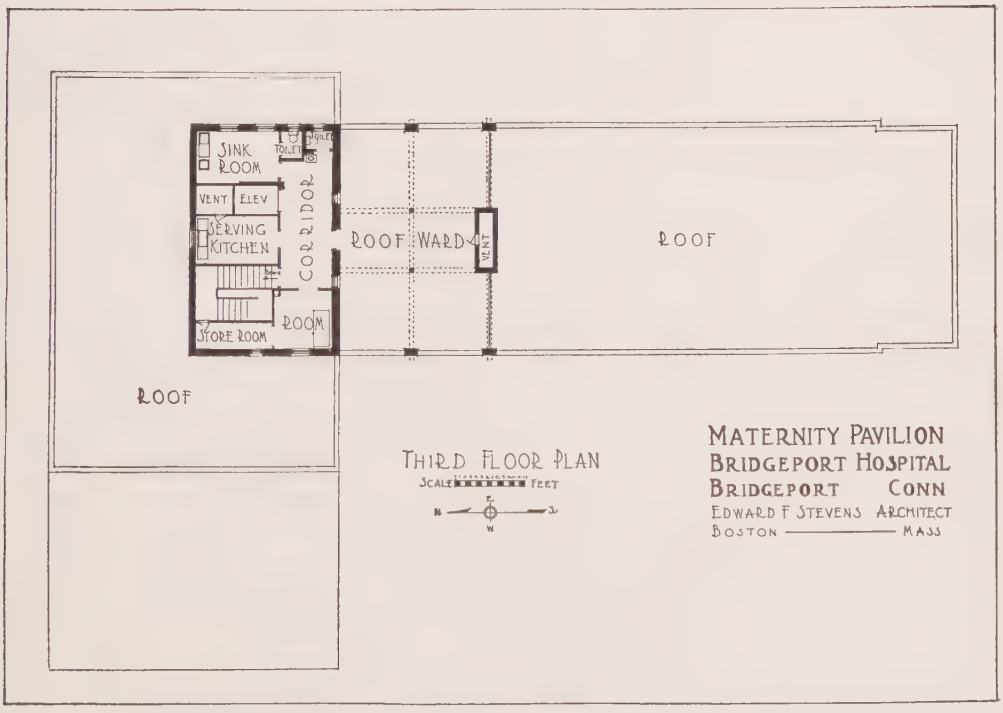


FIG. 71. MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

FIG. 72. EXTERIOR, MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

FIG. 73. MATERNITY WARD, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

FIG. 74. PRIVATE ROOM, MATERNITY BUILDING, BRIDGEPORT (CONN.) HOSPITAL.
Edward F. Stevens, Architect.

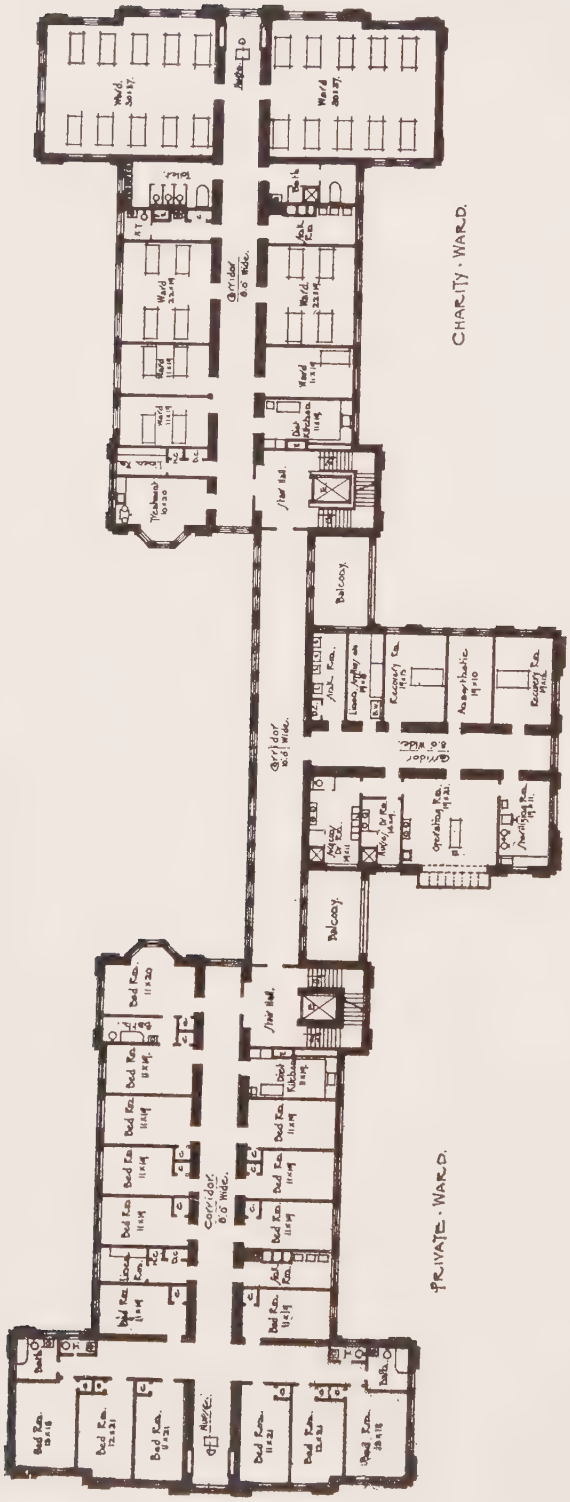


FIG. 75. GALLOWAY MEMORIAL HOSPITAL, NASHVILLE, TENN.
Samuel Hannaford & Sons, Architects.

The third floor is the maternity department, wards and private rooms, with two delivery rooms, labor room and accessories, two nurseries, and an isolation department for infected cases.

The fourth floor consists of wards for semi-private cases. The fifth, comprising seventy private rooms, has twelve provided with baths, making especially flexible units. There are very large balconies, and all doors throughout the hospital will admit of beds being moved in and out. On each floor there is space reserved for wheel chairs and stretchers.

The sixth floor contains the operating department, and roof wards with all requisite utilities, located near the elevator.

In the *Notre Dame Hospital,* Montreal (Figs. 87-92), the irregular H-shape of

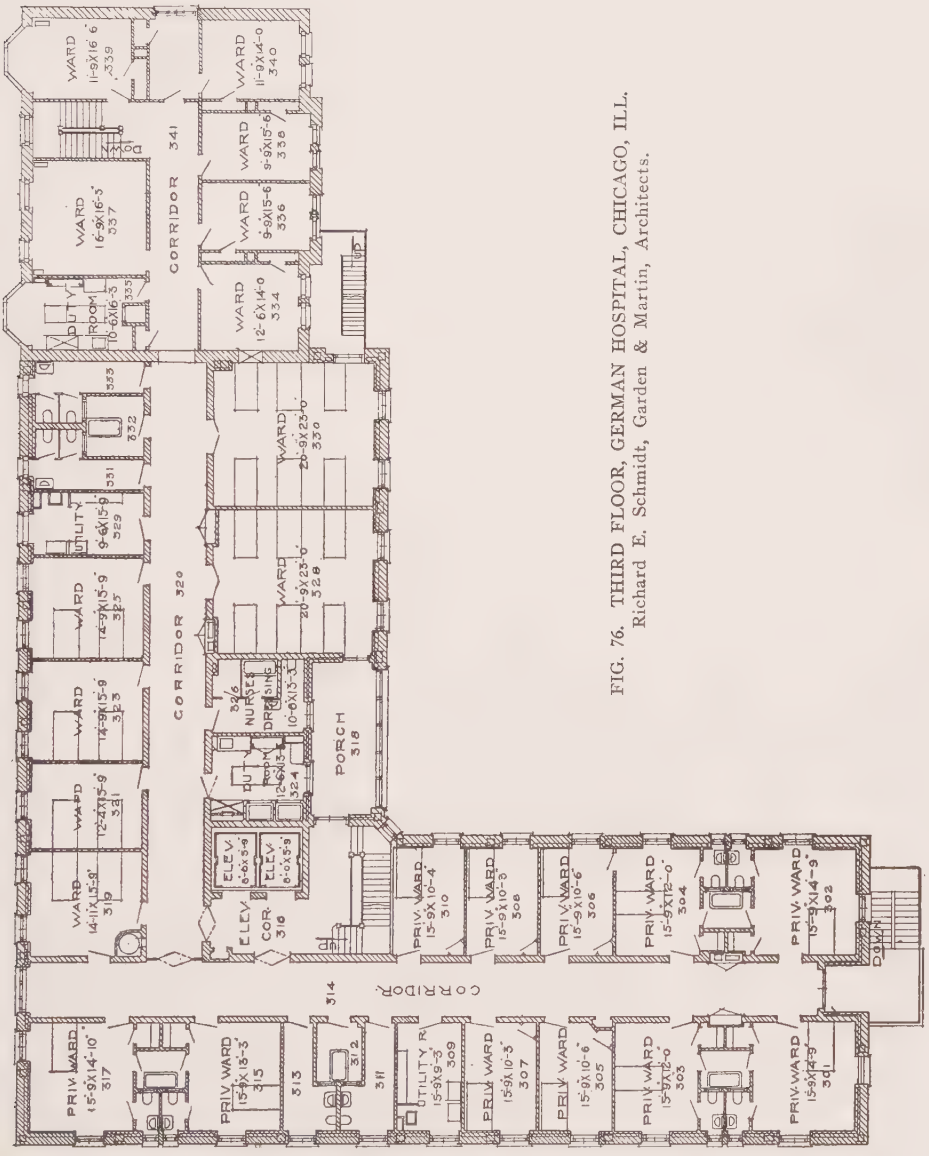


FIG. 76. THIRD FLOOR, GERMAN HOSPITAL, CHICAGO, ILL.
Richard E. Schmidt, Garden & Martin, Architects.

the building is due to the size and shape of the plot of ground. The considerable slope was made a reason for locating the entrances for ambulance cases and out-patients at the rear of the main part of the building. There is one admitting department for both in and out patients, located here.

On the ground floor (Rez de Chausseé) the right wing is devoted to the out-patient department; the center to the laboratories—pathological, chemical and bacteriological, and the autopsy; the left wing contains the medical treatment department, the occupational therapy room, and two isolation departments, each self-contained.

The first floor (1er Etage) is given up to wards, except the center administration portion. The second floor (2me

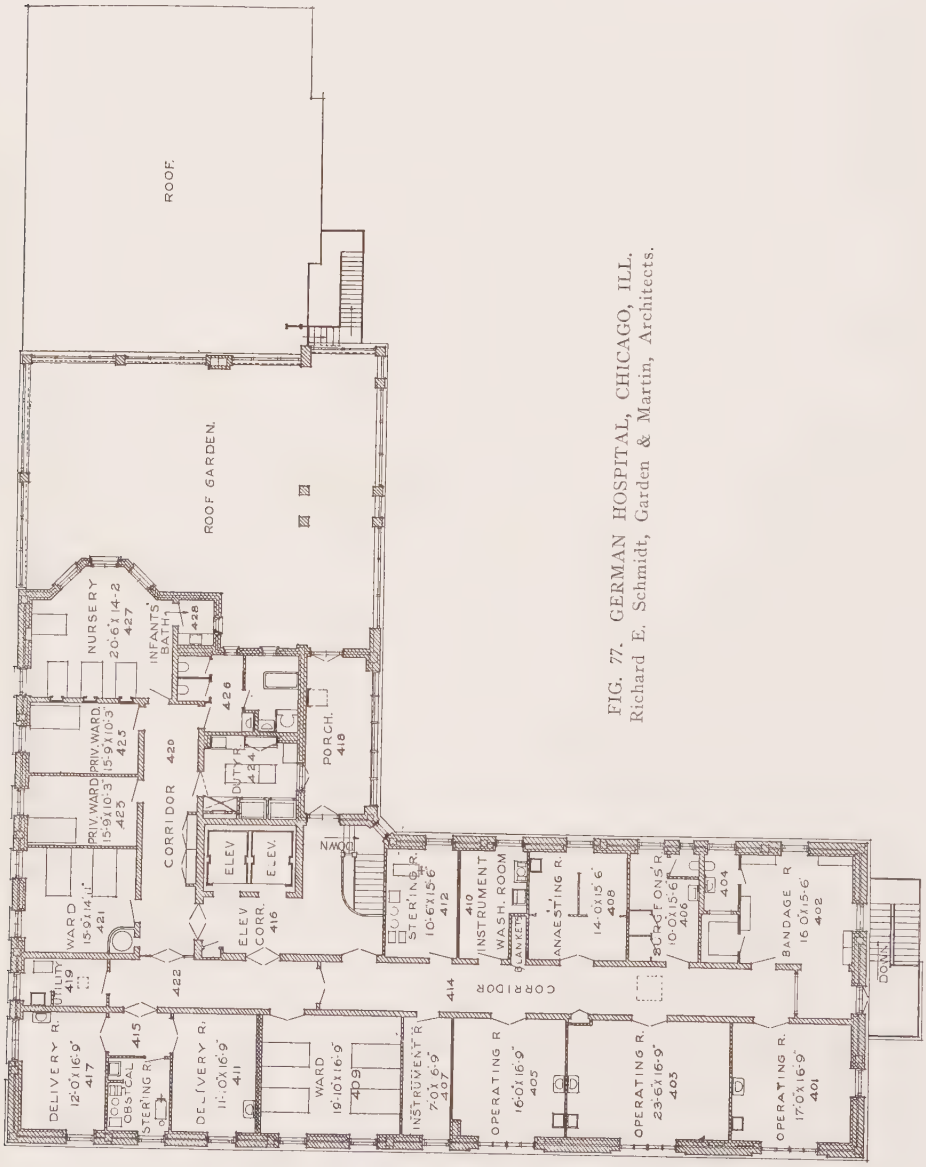


FIG. 77. GERMAN HOSPITAL, CHICAGO, ILL.
Richard E. Schmidt, Garden & Martin, Architects.

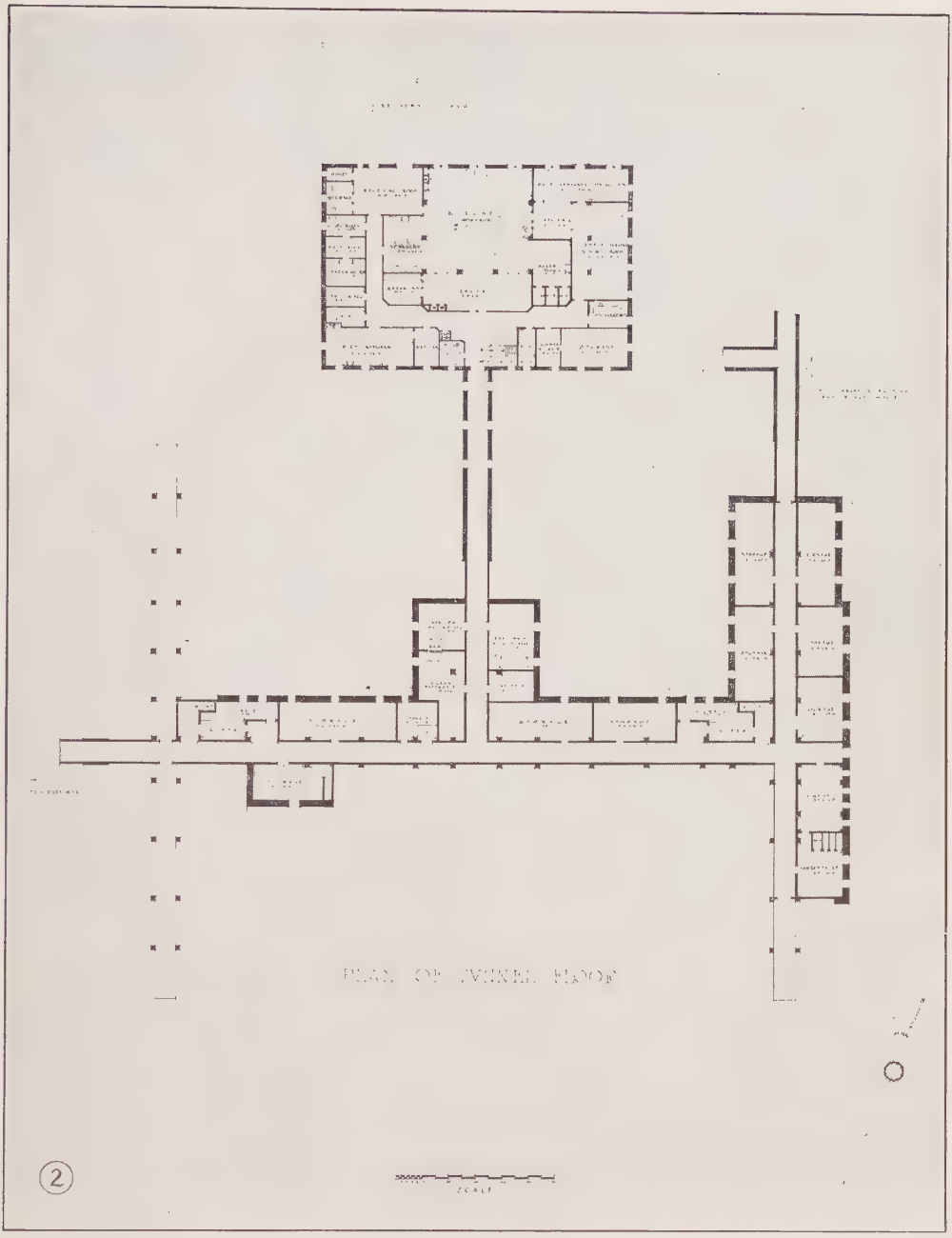


FIG. 78. OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

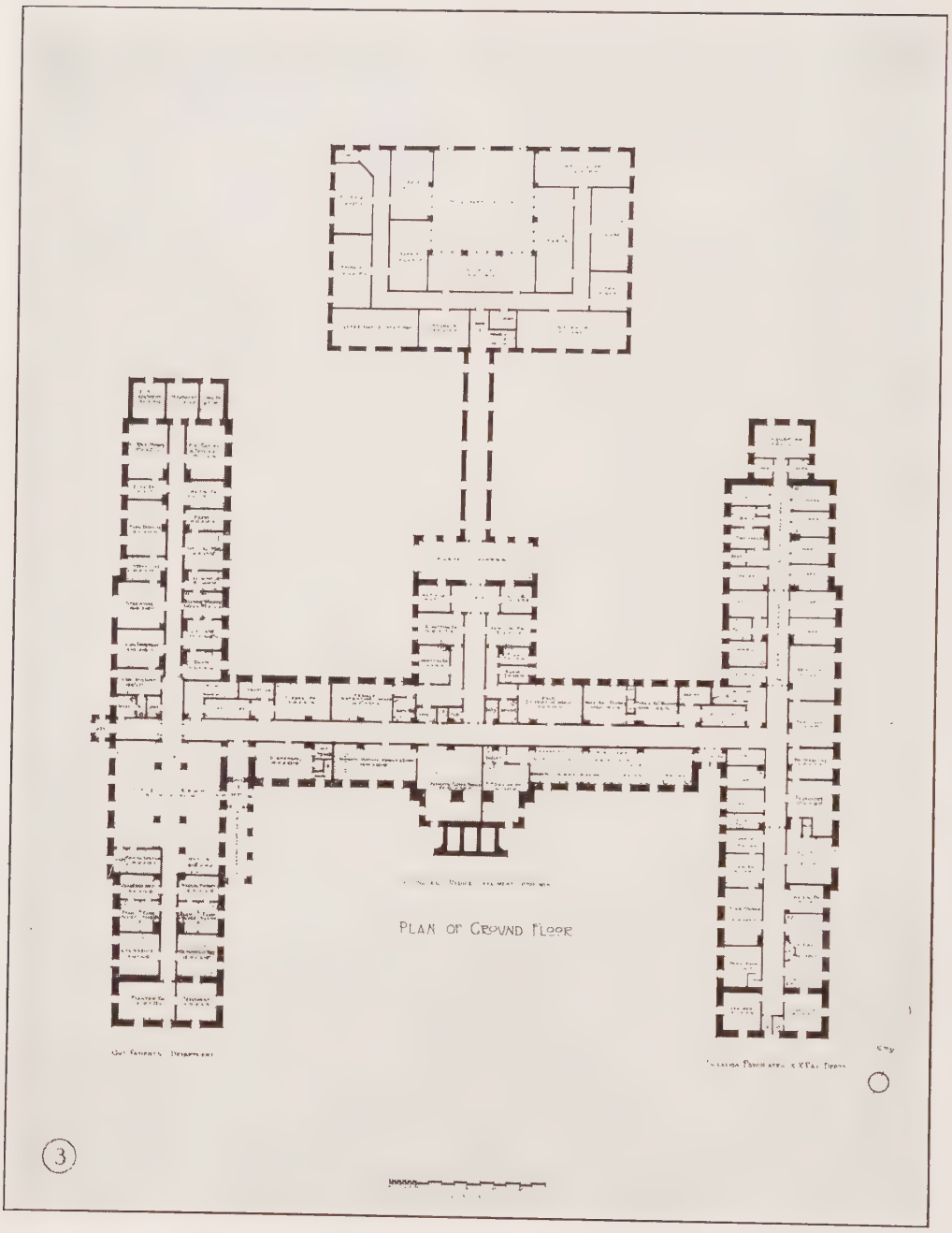


FIG. 79. OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

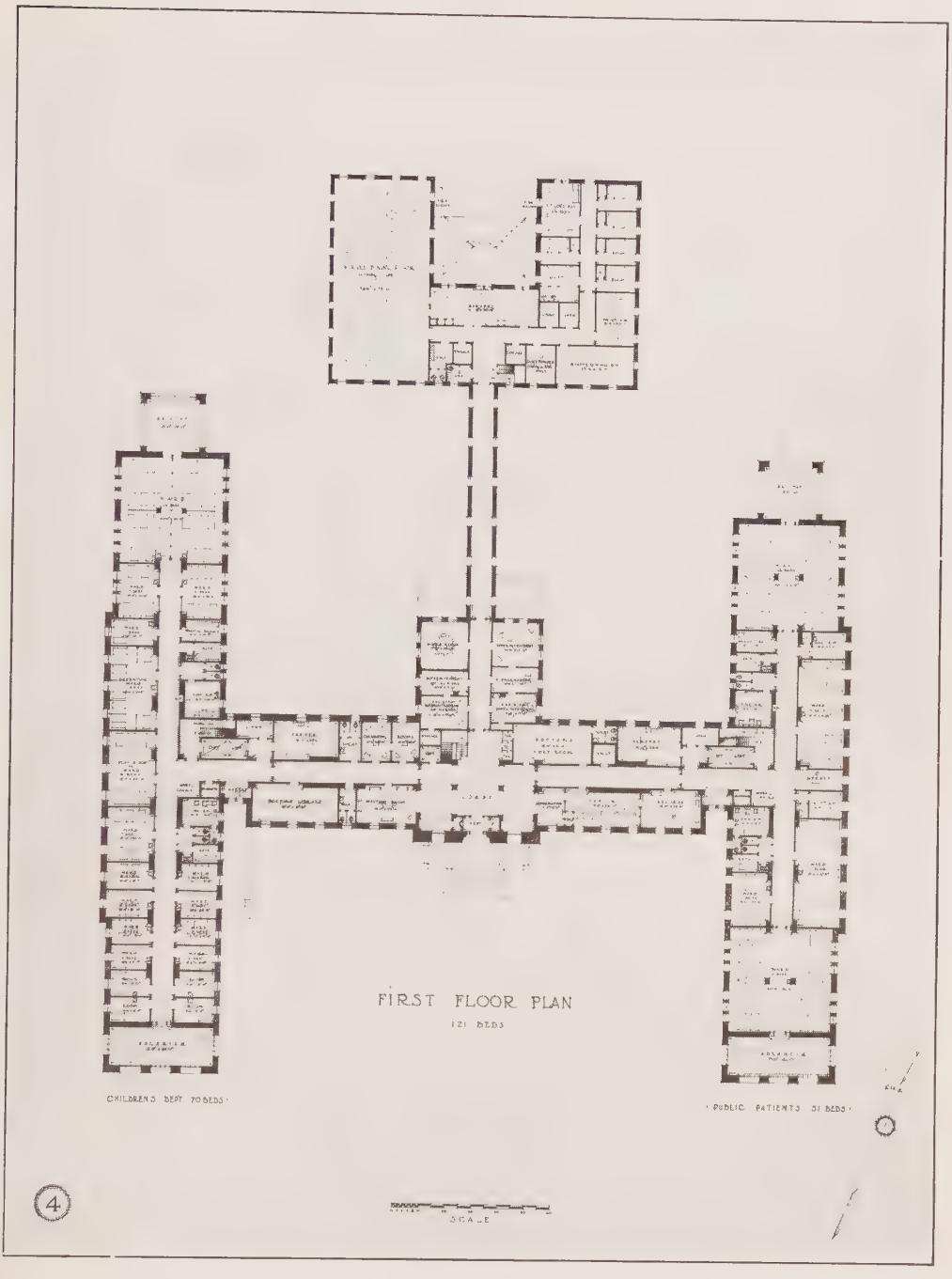


FIG. 80. OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

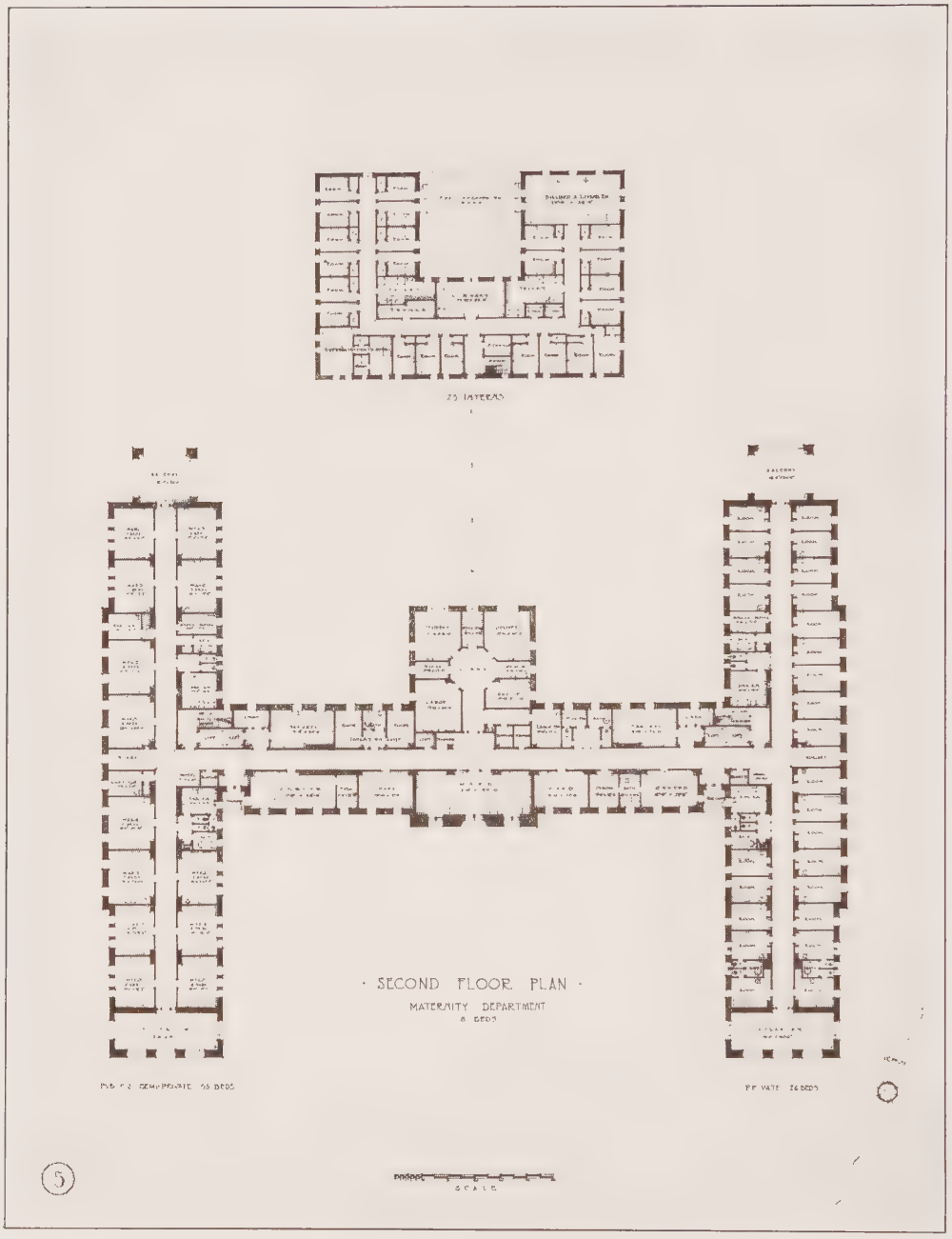


FIG. 81. OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

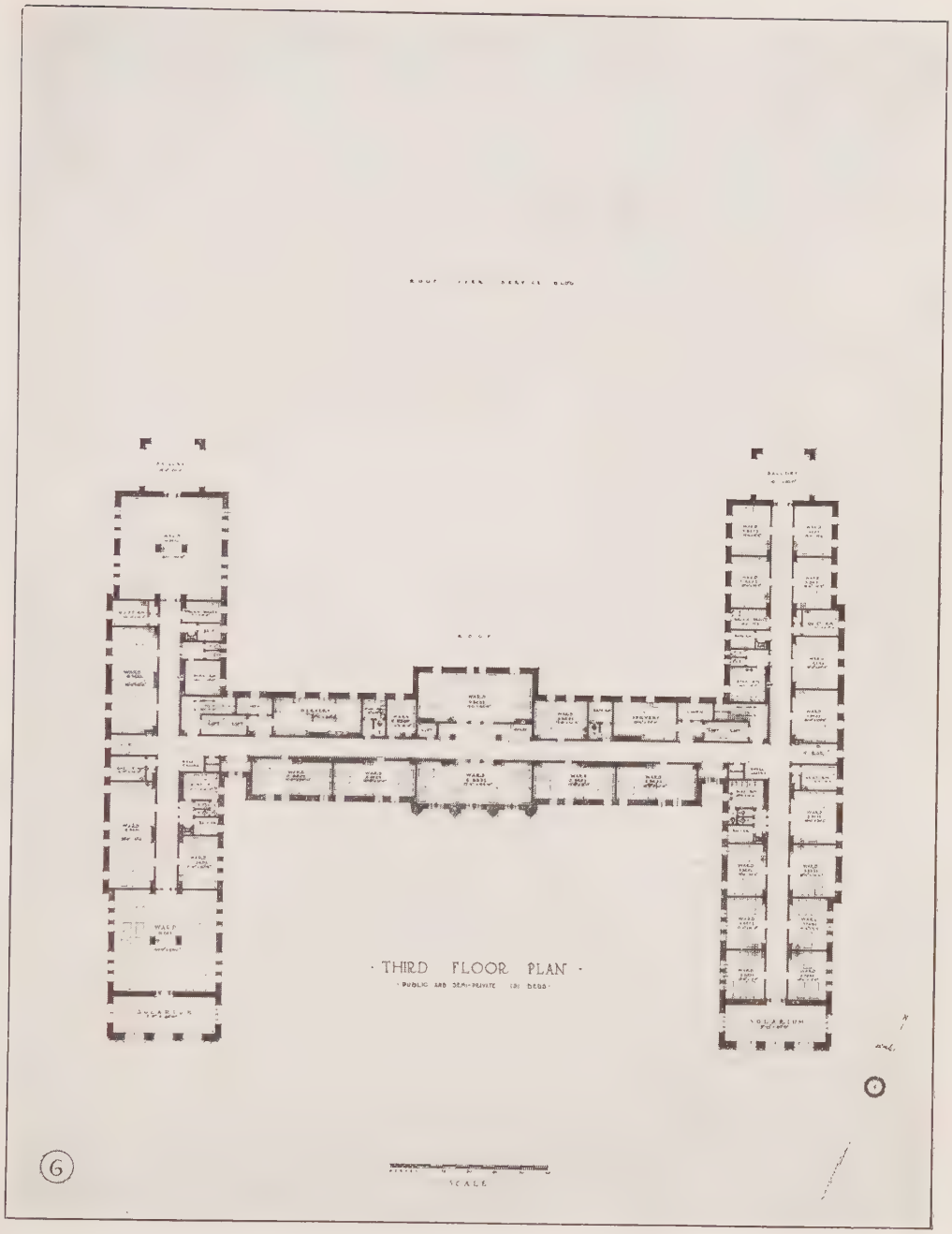


FIG. 82. OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

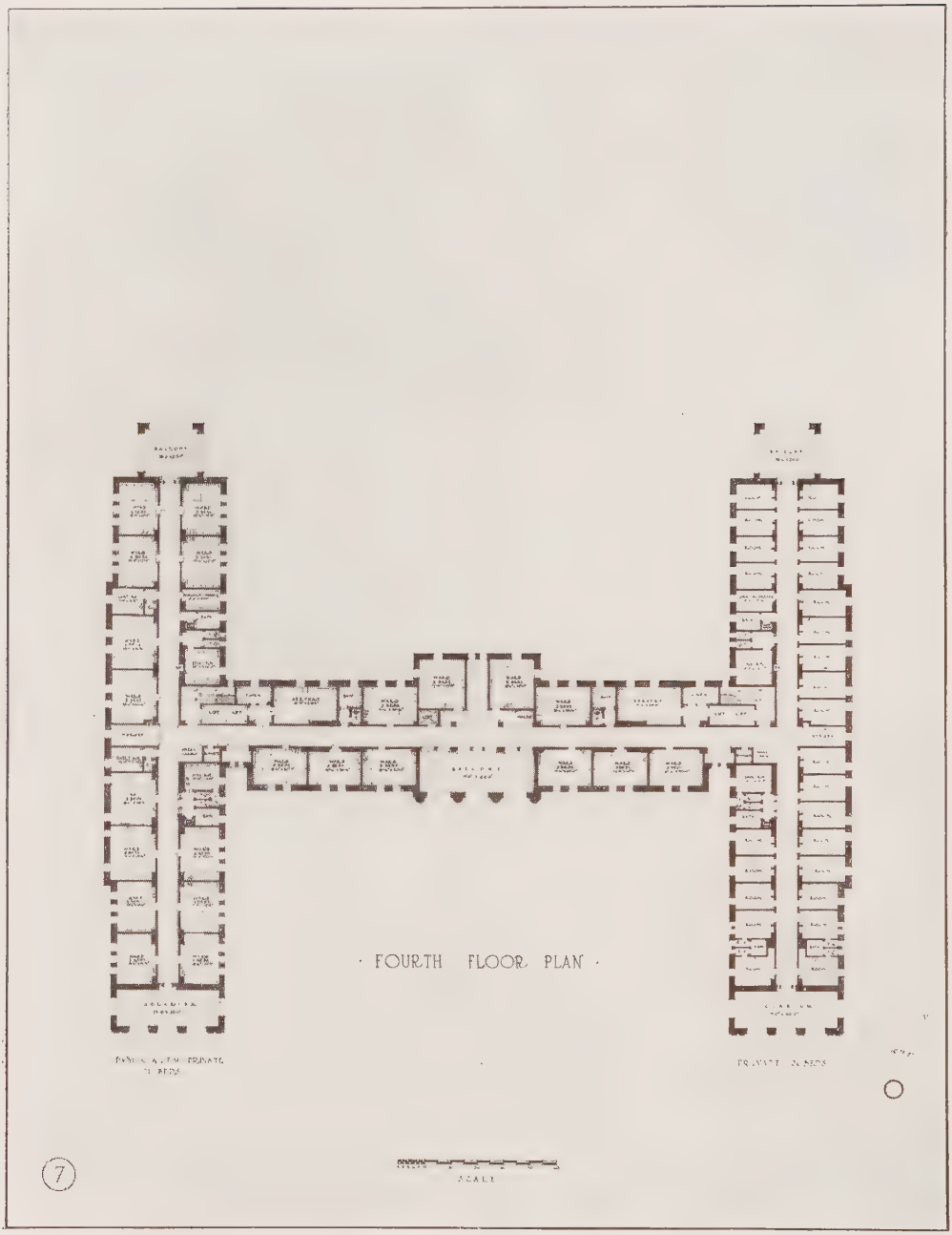


FIG. 83. OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

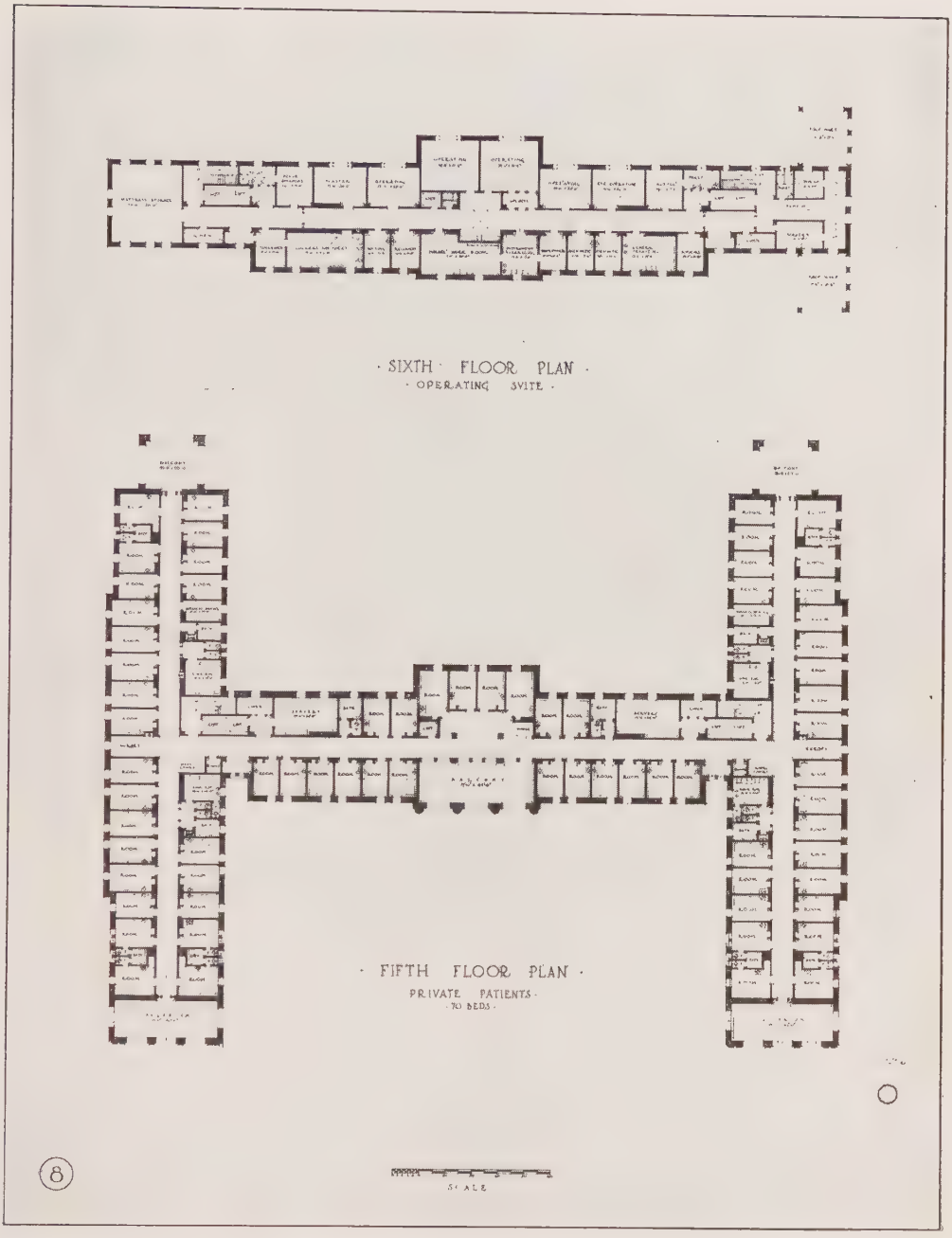


FIG. 84. OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

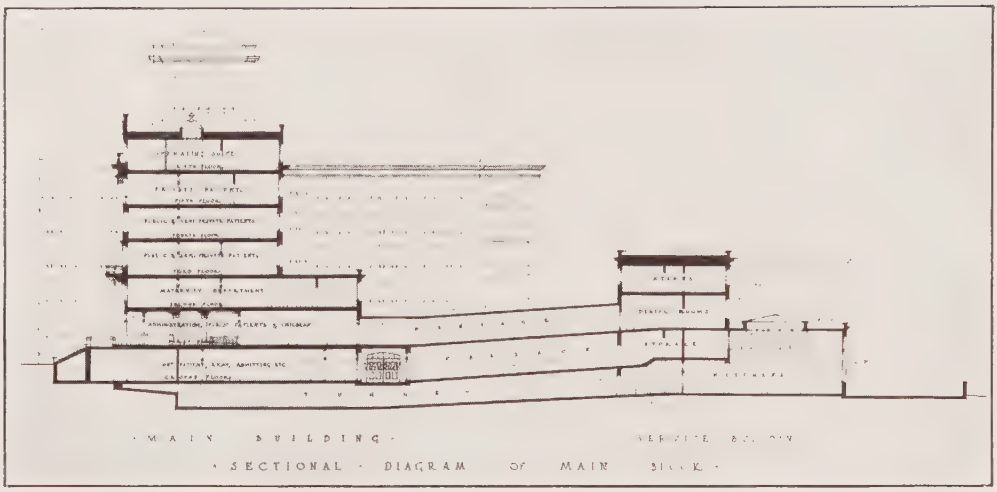


FIG. 85. SECTION, OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.

Etage) and the third (3me Etage) each contain three units of wards, the sixteen-bed wards being divided into four sections (the Rigs design). There are many three and four bed wards, and a number of single rooms for seriously ill or disturbing cases. There are two large serving kitchens (Office), three nurses' stations (Garde Malade), a surgical dressing room (Pansements), and ample, easily accessible balconies. The fourth and fifth floors, of sixty-five private rooms each, have similar utilities.

The sixth floor contains the Roentgen-ray department, at the left, the remainder being the surgery, with four operating rooms, a plaster room, etc.

All floors are planned so that the left wing can be built after the remainder of the hospital is in use.

The *Reid Memorial Hospital,* Richmond, Ind (Figs. 93, 94, 95), shows an interesting unit added to an existing building. The first floor provides three-bed wards, double rooms and private rooms, totalling forty beds. There is a centrally-located nurses' station, a large serving kitchen, three utility rooms, a small room for flowers, a solarium, a covered and an open balcony. The maternity and children's departments, on the second floor, are small but complete. An interesting feature is the roomy, enclosed ambulance entrance.

The main building of the *Salem Hospital,* Salem, Mass. (Figs. 96, 97, 98, 98A), presents a good example of how all departments may be planned for under one roof. There is a complete administration department, men's and women's medical and surgical, with provision for isolating venereal or other cases, a children's department, a maternity department with two delivery rooms and a separate section for private patients. There are extensive balconies. The utilities are well placed.

The *Ohio Valley General Hospital* (Fig. 103) was built on one of the many hills of West Virginia, which made it necessary to utilize the various grades of the streets surrounding the site. An almost precipitous cliff at the north determined the outline of the north wing.

The hospital is a block type, self-contained institution. It is planned to care for all departments of a general hospital —out-patients, accident, surgical, medical, maternity, children's, contagious—as well as for the segregation of colored patients. It is also provided with heating, lighting, and refrigerating plants, as well as a distilling plant for distilling all the drinking water and that used in connection with the surgical departments.

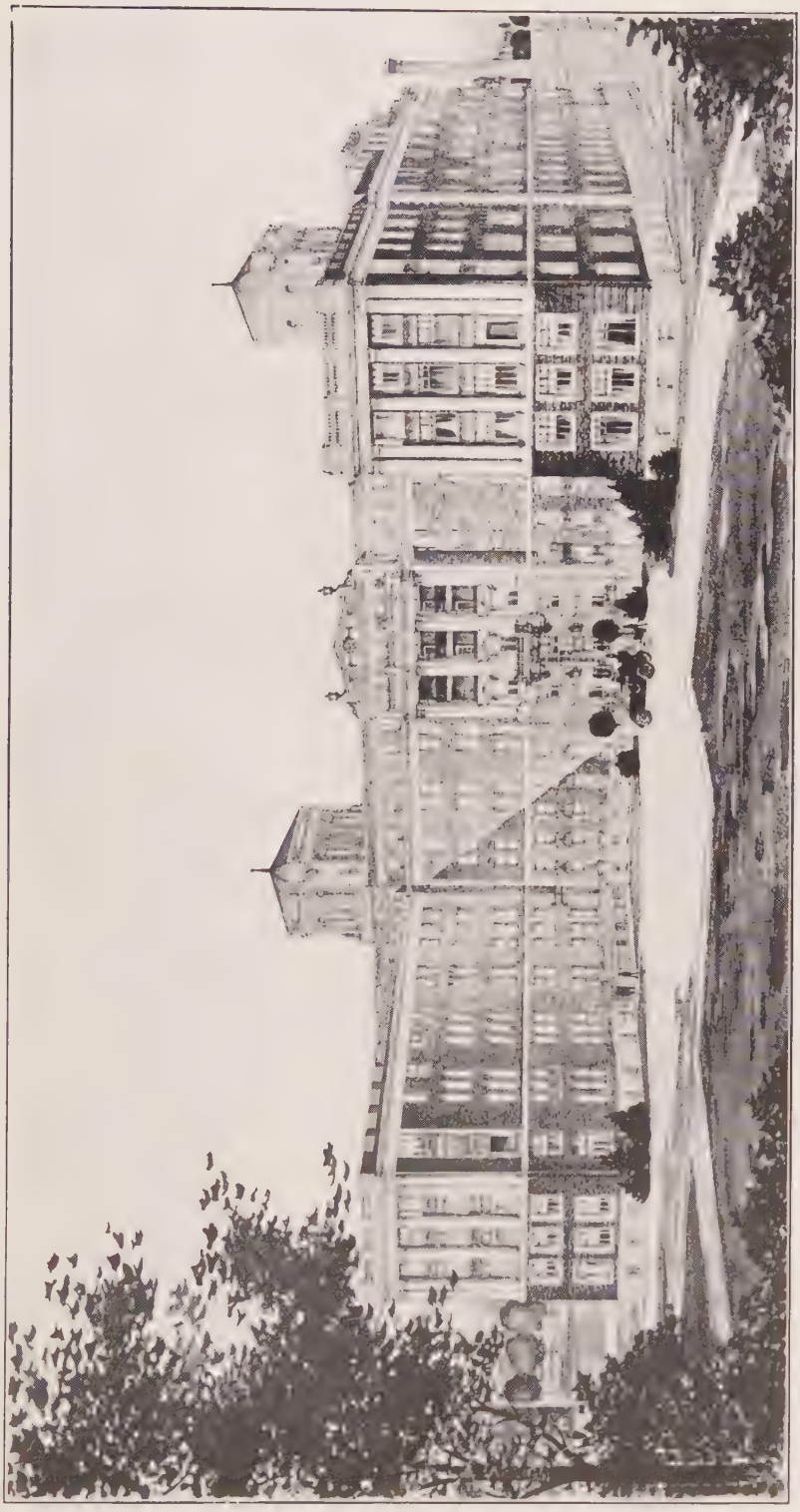
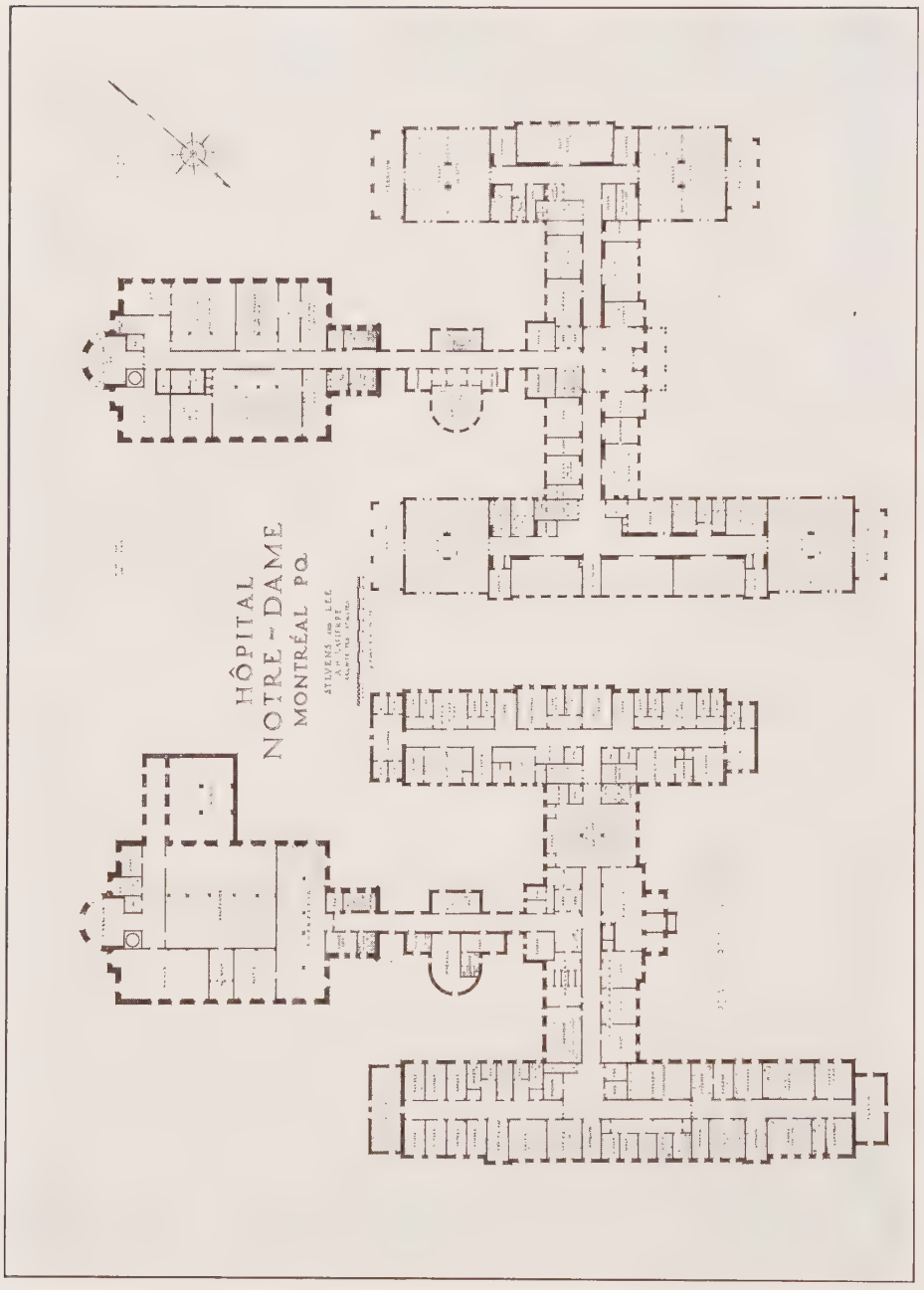
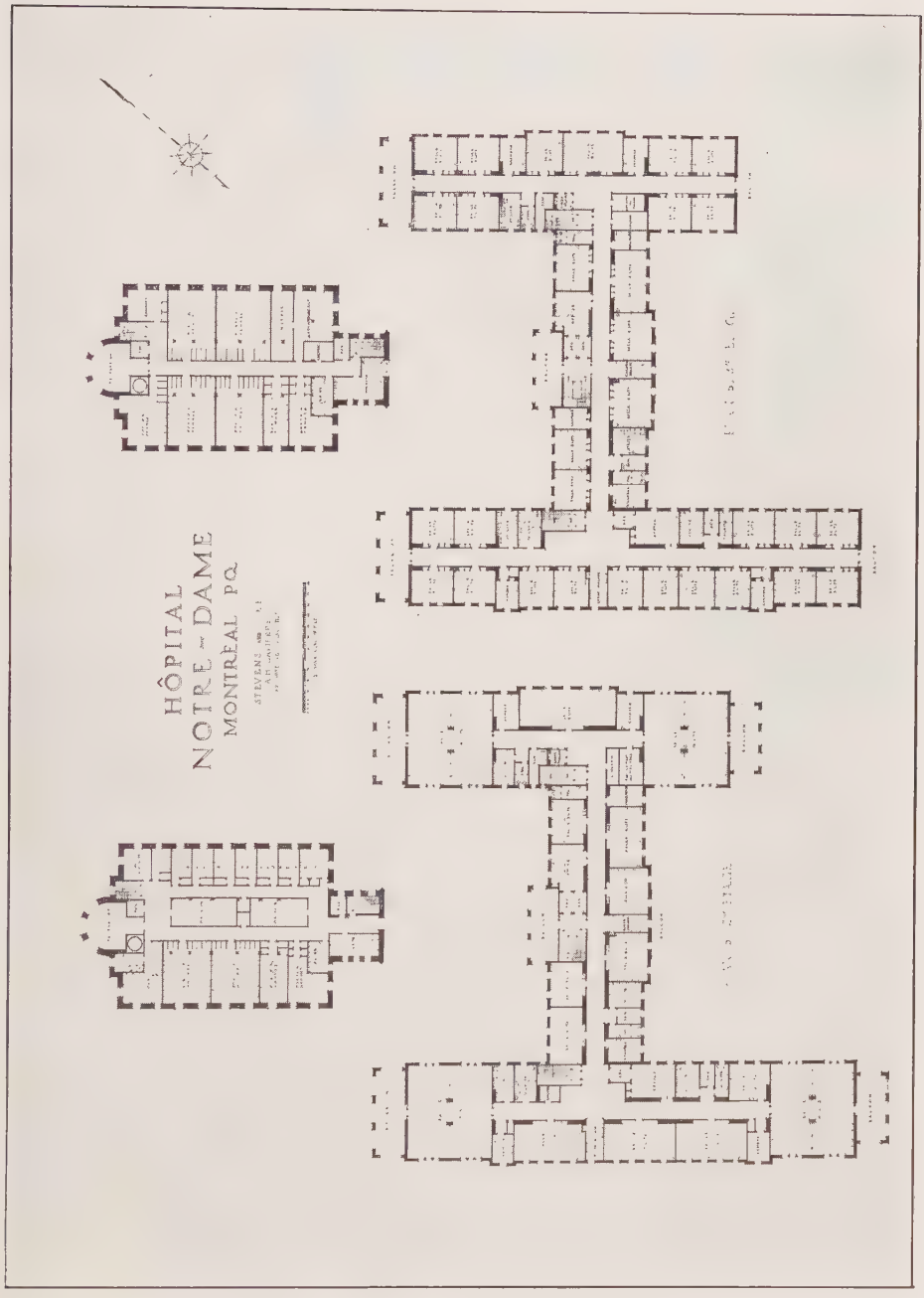


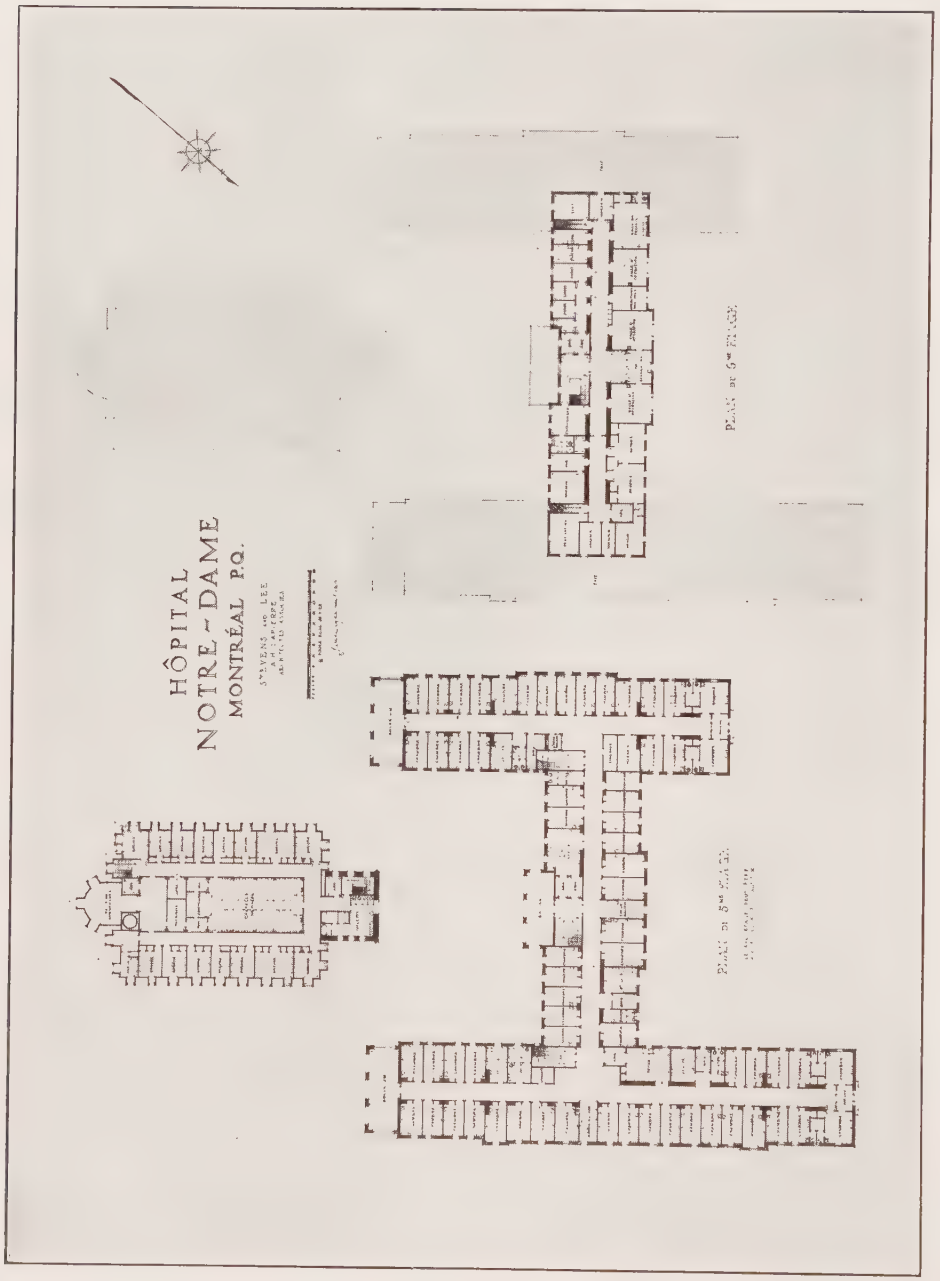
FIG. 86. EXTERIOR, OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects. J. Albert Ewart, Associate.



FIGS. 87 AND 88. NOTRE-DAME HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects. A. H. Lapierre, Associate.



FIGS. 89 AND 90. NOTRE-DAME HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects. A. H. Lapierre, Associate.



FIGS. 91 AND 92. NOTRE-DAME HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects. A. H. Lapierre, Associate.

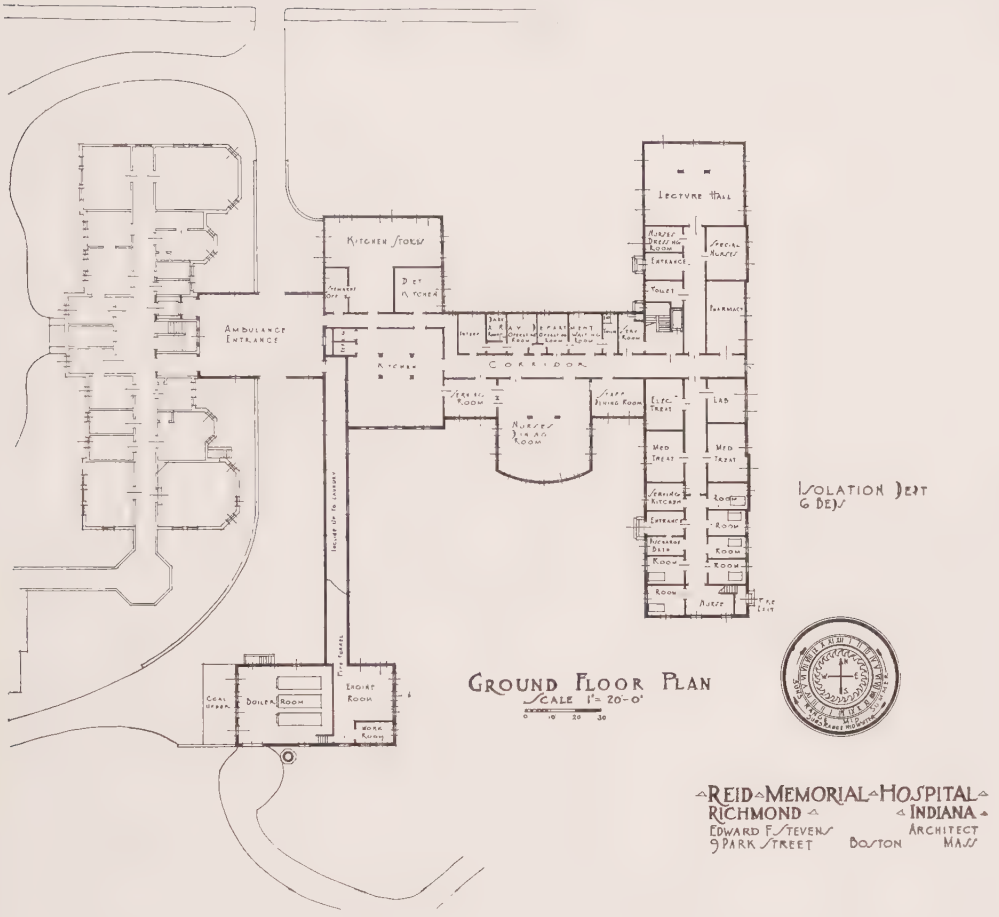


FIG. 93.

In planning this institution, it was decided to have no wards larger than eight beds, as a better segregation of cases could be obtained than by using large wards. This being a general hospital, both private and charity cases are cared for.

Provision is made on every floor for airing balconies (Fig. 104) so that all patients can be wheeled into the open when desired. A large roof ward is provided on the upper story.

The combining of the contagious department (Fig. 102) with the general hospital within the same walls is practiced here without any serious complications or cross infections.

The *Macon Hospital* (Fig. 106) like many another institution throughout the United States, found that its work was deficient on account of lack of better facilities for the care of the sick; additional land was secured in two different directions and the development of the institution has been attempted. The old buildings, A, B, and C, have been remodelled and put into working condition. The ward unit in Building B has been rearranged on the "Rigs" type, providing for sixteen beds, with quiet rooms and utilities, while the old children's ward has been made into a modern serving kitchen. The old staircases and general partitions in A, B, and C have been largely retained, but the utilities have been enlarged.

Pavilions D, E, and F are new. Pavilion D is practically for private patients and consists of private rooms and the

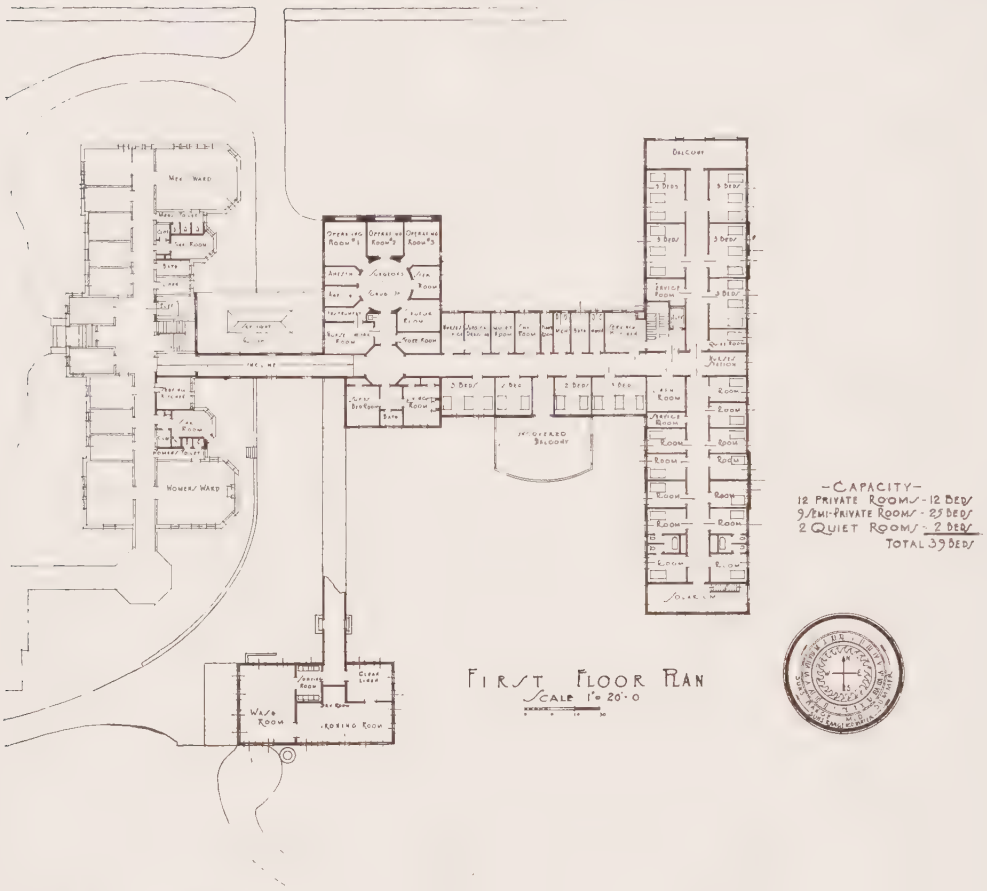


FIG. 94.

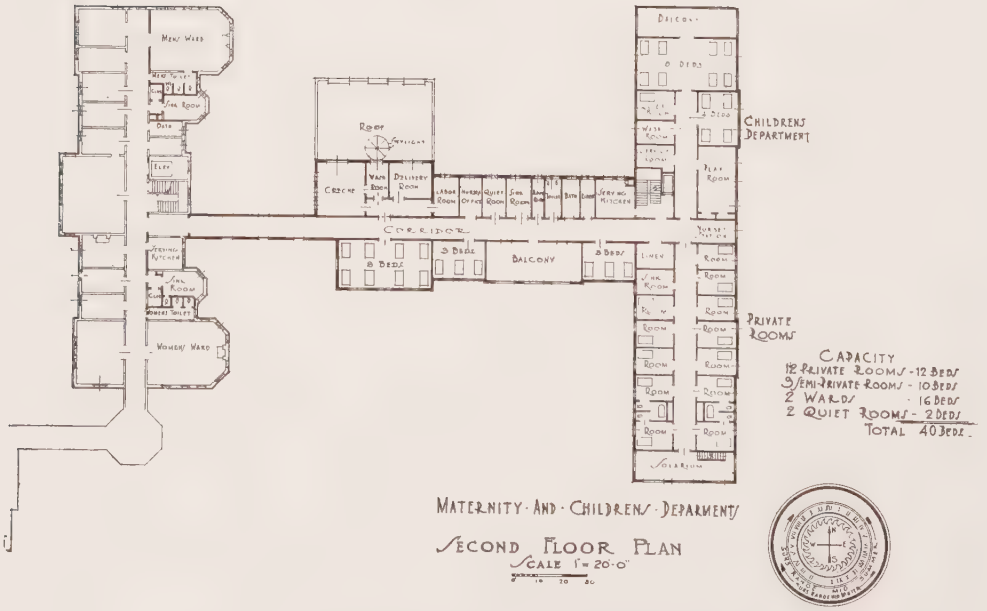


FIG. 95.
REID MEMORIAL HOSPITAL, RICHMOND, INDIANA
Edward F. Stevens, Architect.

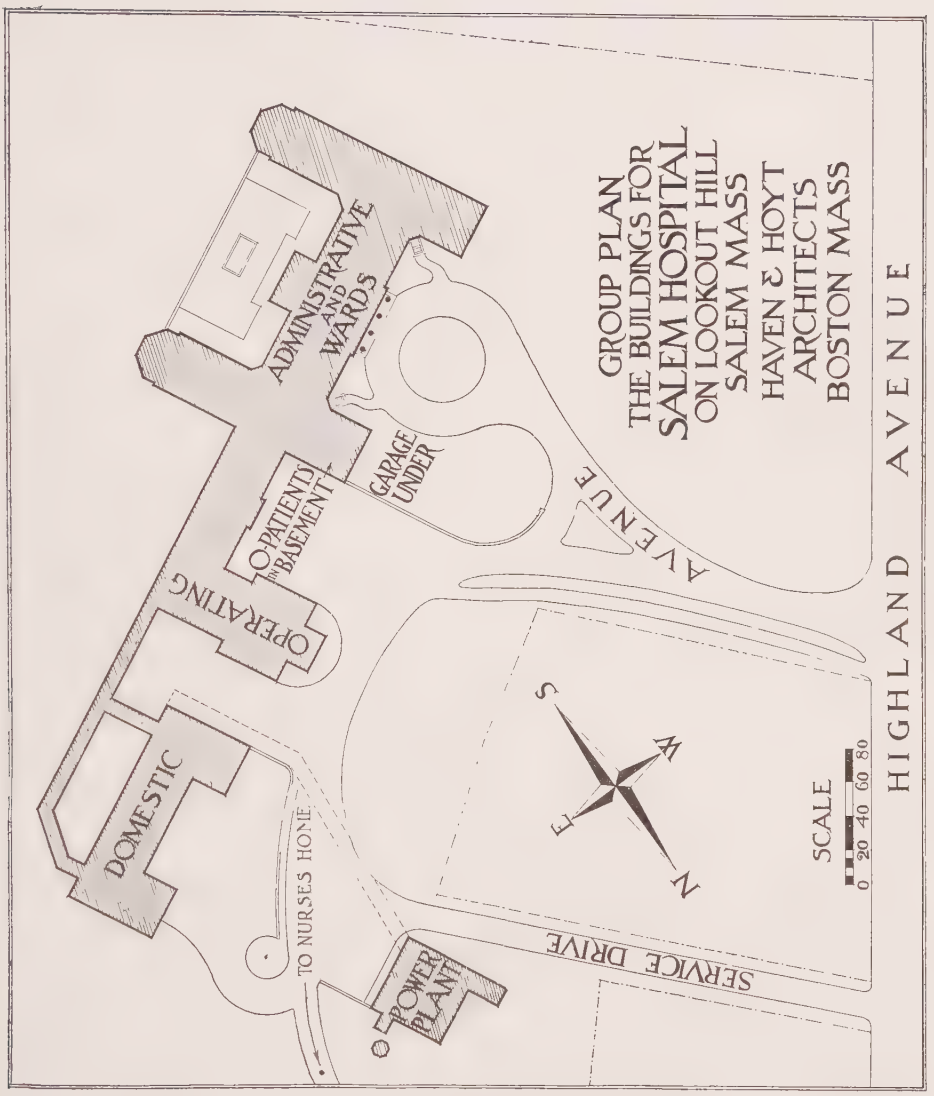

GROUP PLAN
THE BUILDINGS FOR
SALEM HOSPITAL
ON LOOKOUT HILL
SALEM MASS
HAVEN & HOYT
ARCHITECTS
BOSTON MASS
HIGHLAND AVENUE
AVENUE
ADMINISTRATIVE AND WARDS
GARAGE UNDER
PATIENTS' BASEMENT
OPERATING
DOMESTIC
TO NURSES HOME
POWER PLANT
SERVICE DRIVE
SCALE
0 20 40 60 80
S
W
E
N

FIG. 96.

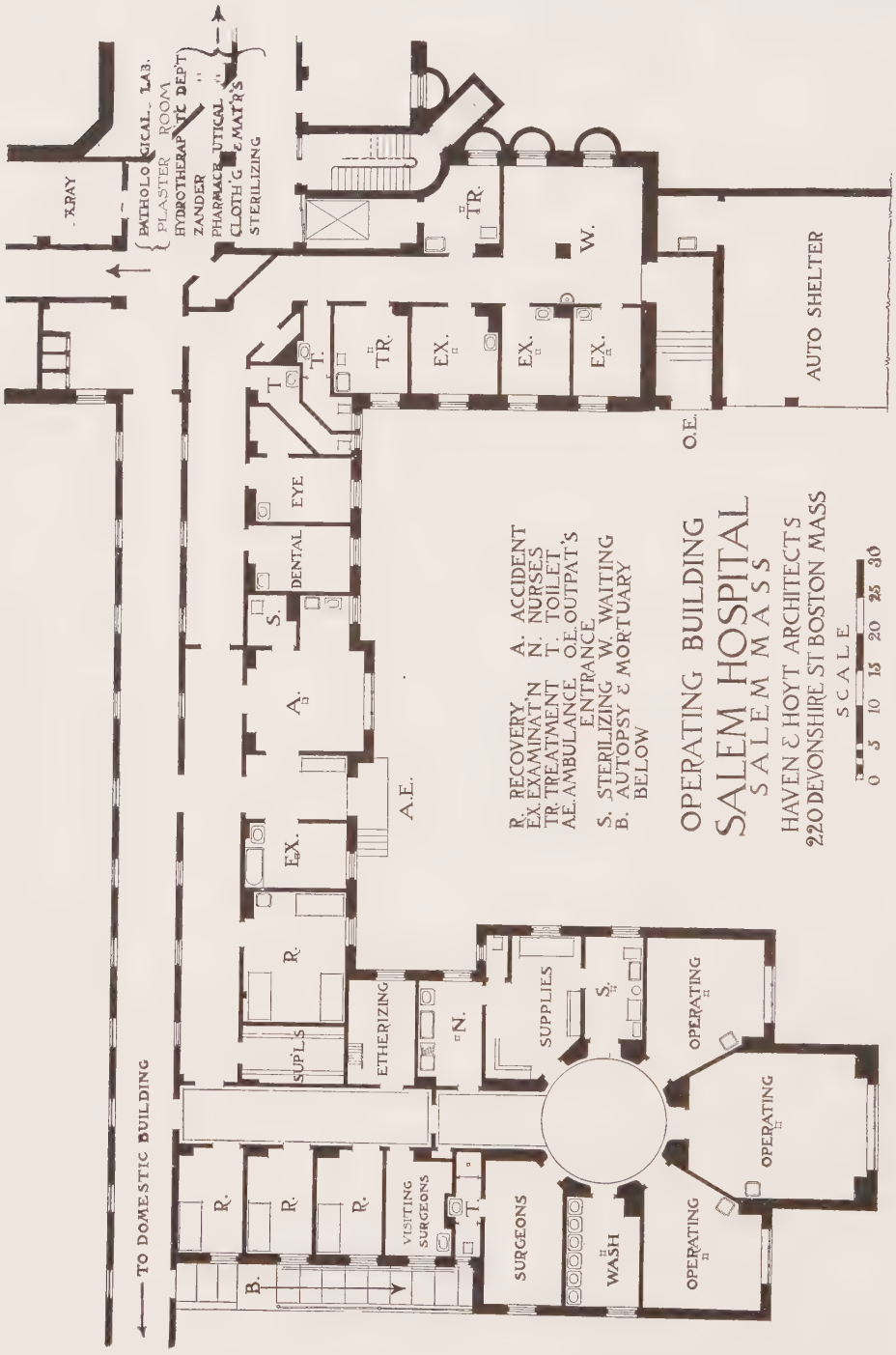

TO DOMESTIC BUILDING
X-RAY
PATHOLOGICAL LAB.
PLASTER ROOM
HYDROTHERAPEUTIC DEPT
ZANDER
PHARMACEUTICAL
CLOTH'G & MAT'R'S
STERILIZING
R. RECOVERY
EX. EXAMINAT'N
TR. TREATMENT
AE. AMBULANCE ENTRANCE
S. STERILIZING
B. AUTOPSY & MORTUARY BELOW
A. ACCIDENT
N. NURSES
T. TOILET
O.E. OUTPAT'S
W. WAITING
OPERATING BUILDING
SALEM HOSPITAL
SALEM MASS
HAVEN & HOYT ARCHITECTS
220 DEVONSHIRE ST BOSTON MASS
SCALE
0 5 10 15 20 25 30
AUTO SHELTER
O.E.
W.
TR.
EX.
EX.
EX.
T.
T.
EYE
DENTAL
S.
A.
A.E.
EX.
R.
SUPL'S
ETHERIZING
N.
SUPPLIES
S.
OPERATING
OPERATING
OPERATING
WASH
SURGEONS
T.
VISITING SURGEONS
R.
R.
R.
B.

FIG. 97.

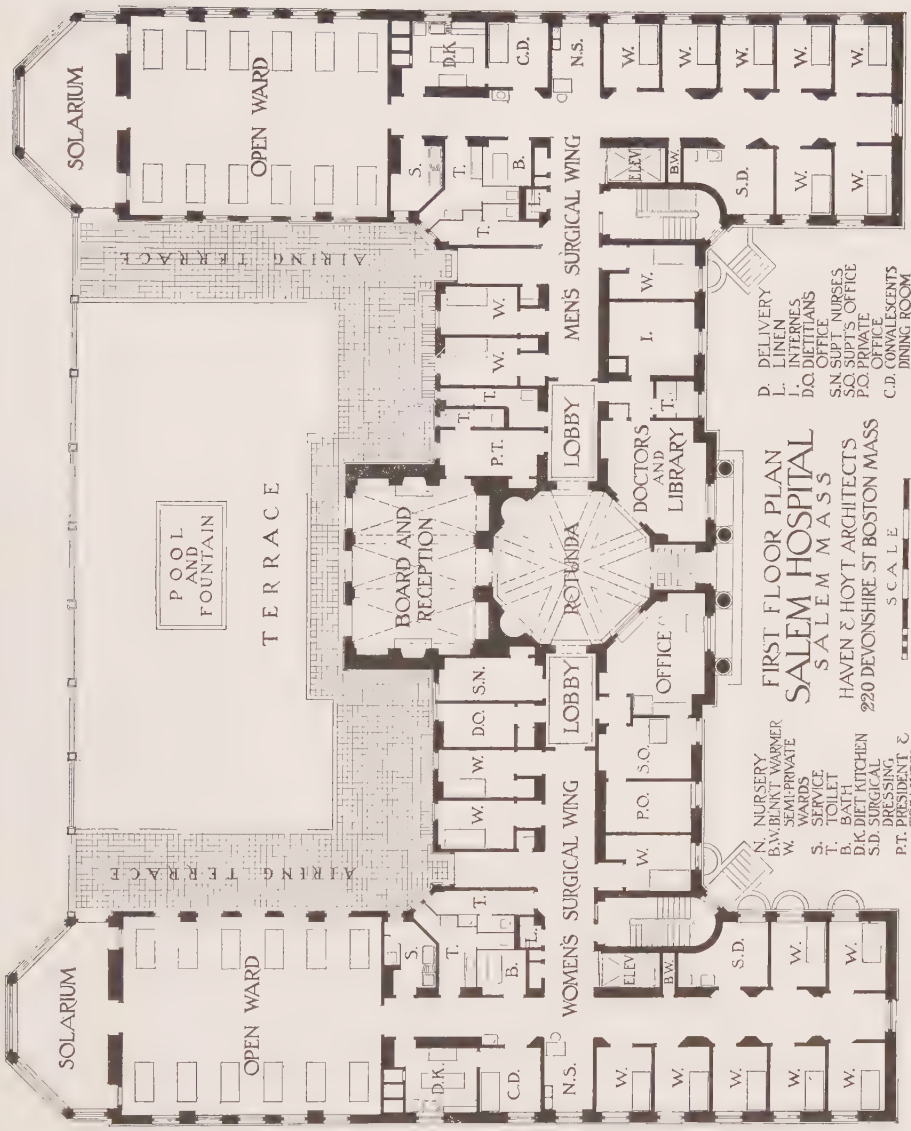

SOLARIUM
OPEN WARD
AIRING TERRACE
POOL AND FOUNTAIN
TERRACE
BOARD AND RECEPTION
ROTUNDA
LOBBY
DOCTORS AND LIBRARY
OFFICE
WOMEN'S SURGICAL WING
MEN'S SURGICAL WING
P.O.
S.O.
S.N.
D.O.
P.T.
ELEV
S.D.
C.D.
D.K.
N.S.
N. NURSERY
B.W. BUNK WARMER
W. SEMI-PRIVATE WARDS
S. SERVICE
T. TOILET
B. BATH
D.K. DIET KITCHEN
S.D. SURGICAL DRESSING
P.T. PRESIDENT & TREASURER
D. DELIVERY
L. LINEN
I. INTERNES
D.O. DIETITIANS OFFICE
S.N. SUPT. NURSES
S.O. SUPT'S OFFICE
P.O. PRIVATE OFFICE
C.D. CONVALESCENTS DINING ROOM
N.S. NURSES STATION
FIRST FLOOR PLAN
SALEM HOSPITAL
SALEM MASS
HAVEN & HOYT ARCHITECTS
220 DEVONSHIRE ST BOSTON MASS
SCALE
0 5 10 15 20 25 30

FIG. 98.

FIG. 98-A. SALEM HOSPITAL, SALEM, MASS.
Haven & Hoyt, Architects.

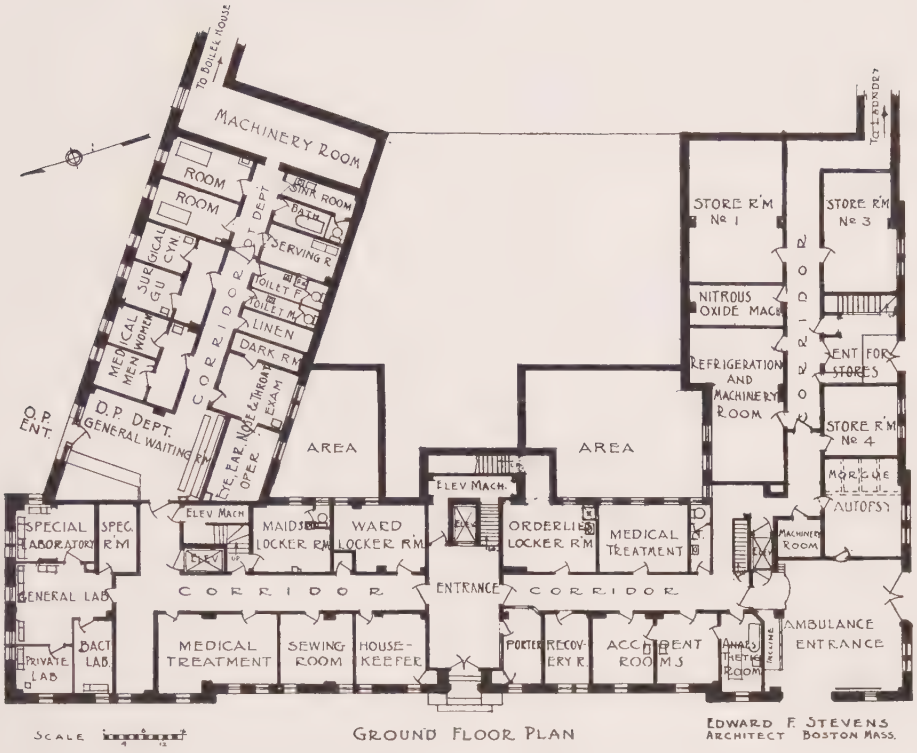


FIG. 99. OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.

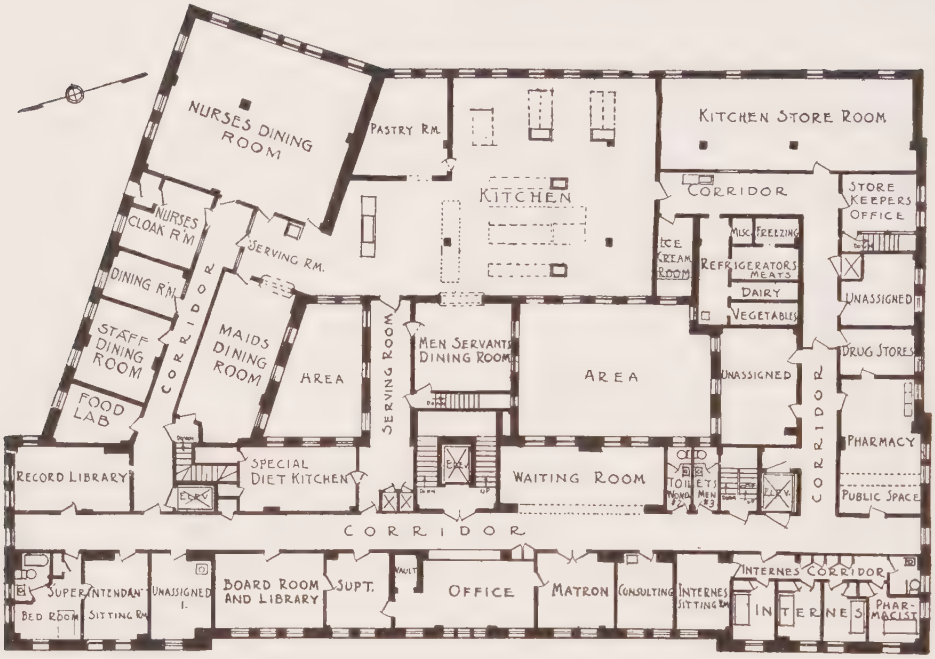
general utilities. Pavilion F is designed for colored patients, who in southern sections, of course, must be segregated from the white patients. The service building E contains the kitchen, dining-room, laundry, power plant, and garage, and is located centrally with respect to the whole group.

The ground floor of the pavilion for negroes, F, is devoted to an out-patient department, which will be described in another chapter.

The third floor of Pavilion D consists of children's and operating departments, which are described in their proper places. The roof ward (Fig. 109) is provided with ample facilities for out-door treatment, and is connected directly with the serving kitchen, elevator, and staircase.

The *Mansfield General Hospital,* at Mansfield, O. (Fig. 110), is another example of the self-contained type, with all departments in one building. In this hospital the attempt has been made to segregate, so far as possible, the divisions of male, female, children's and maternity; and with the T-shape plan which is here adopted this was found to be a comparatively easy problem to solve. A central serving kitchen serves all of the three different departments on each floor. A separate sink and toilet room, however, is provided in each unit. The nurses' station is located in the center, from which point it is possible to observe the three wings of the building. The main offices are located on the first floor; and a small out-patient department, a medical treatment, Roentgen-ray department, the heating plant and the kitchen plant are located on the ground floor. The contour of the site selected allows for good lighting in all departments.

On the second floor (Fig. 111) are located the maternity department and private rooms and suites; and shut off and isolated from the rest of the building is the operating department. The maternity



SCALE

FIRST FLOOR PLAN

FIG. 100. OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

SCALE

FOURTH FLOOR PLAN

FIG. 101. OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

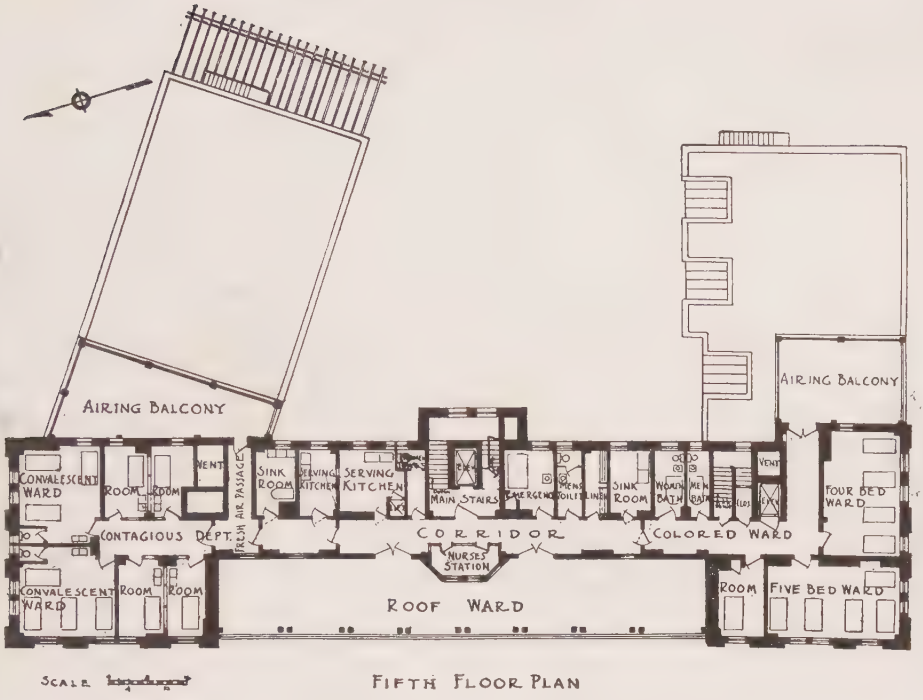
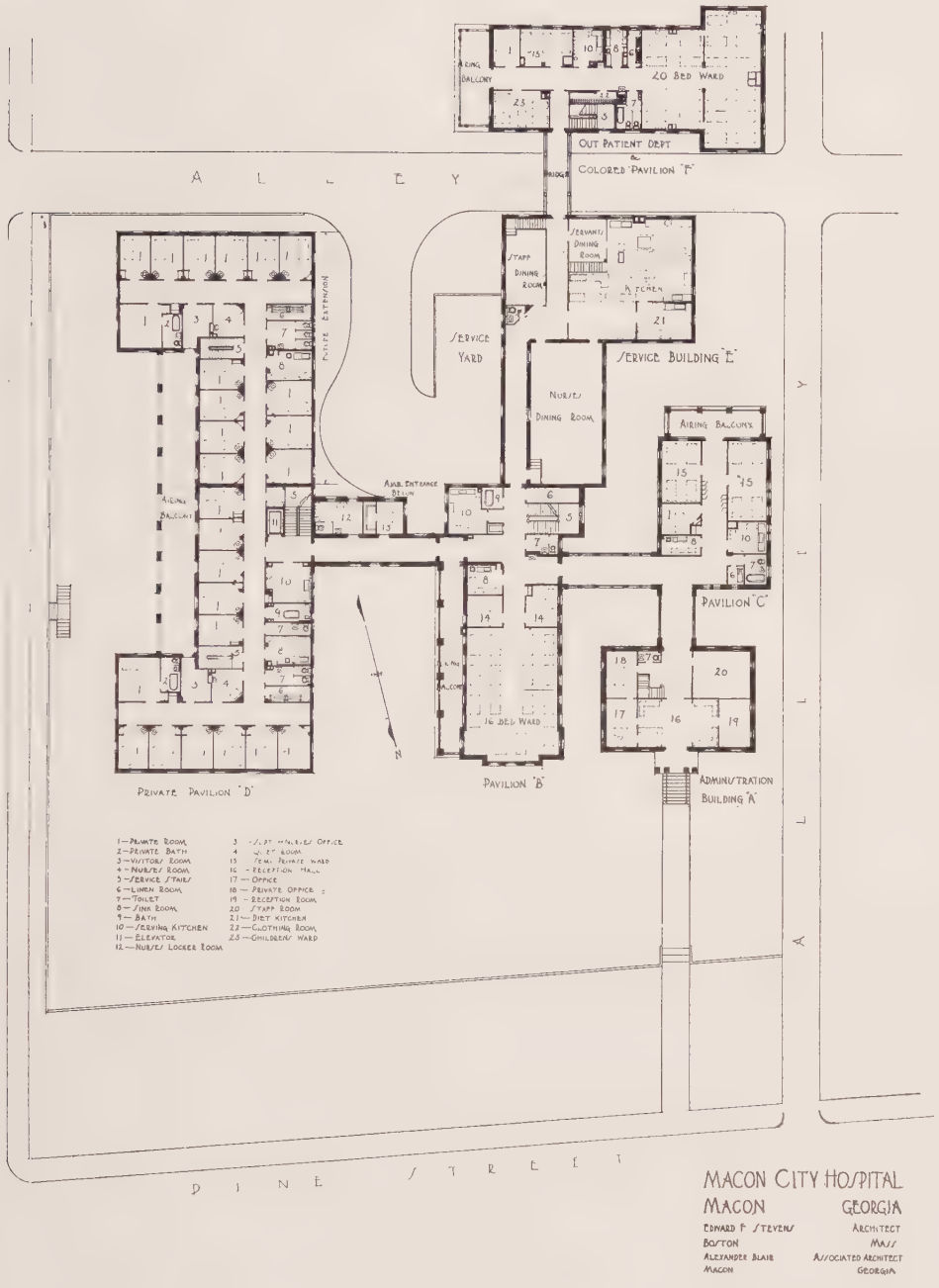


FIG. 102. OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

FIG. 103. OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

FIG. 104. AIRING BALCONY, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

FIG. 105. VIEW FROM REAR, SHOWING AIRING BALCONIES, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.



MACON CITY HOSPITAL
MACON GEORGIA
EDWARD F. STEVENS ARCHITECT
BOSTON MASS.
ALEXANDER BLAIR ASSOCIATED ARCHITECT
MACON GEORGIA

FIG. 106. FIRST FLOOR PLAN.

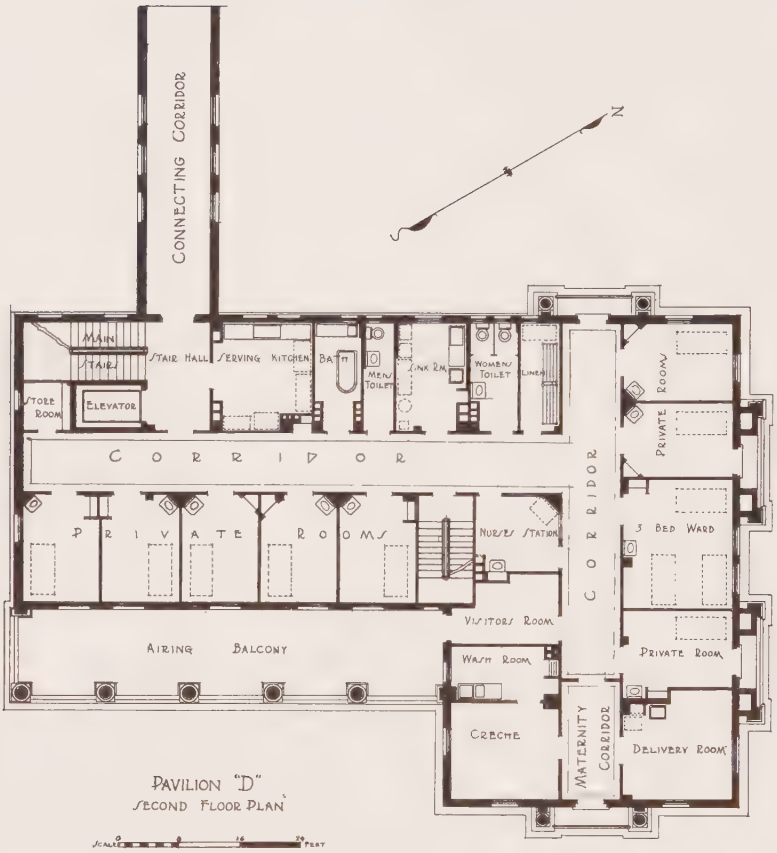


FIG. 107. MACON HOSPITAL, MACON, GA.
Edward F. Stevens, Architect. Alexander Blair, Associate.

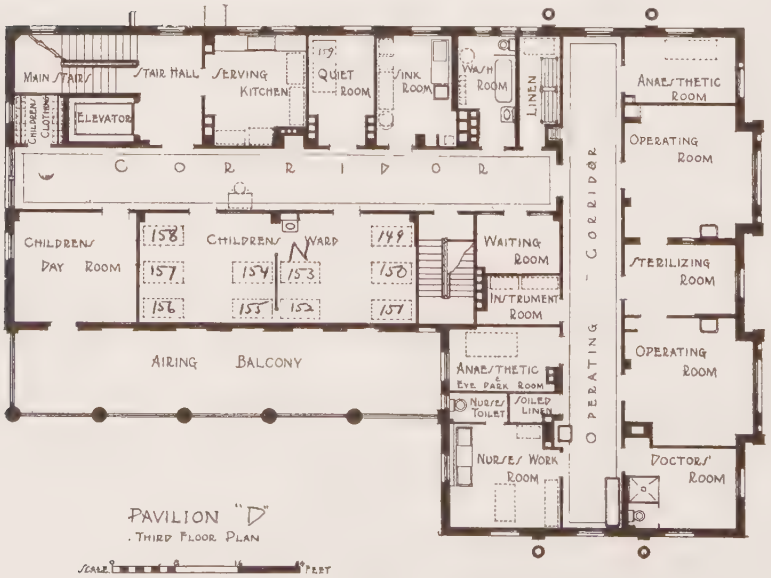


FIG. 108. MACON HOSPITAL, MACON, GA.
Edward F. Stevens, Architect. Alexander Blair, Associate.

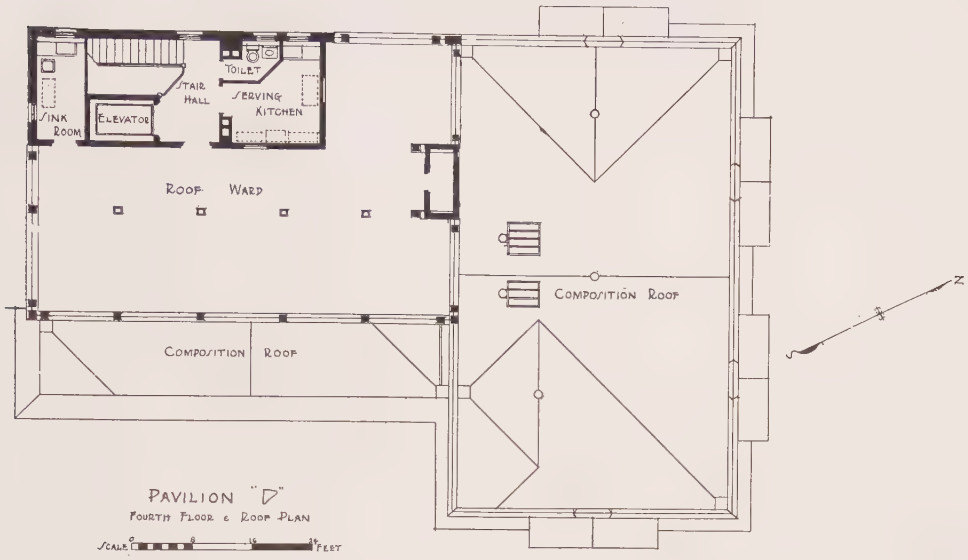


FIG. 109. MACON HOSPITAL, MACON, GA.
Edward F. Stevens, Architect. Alexander Blair, Associate.

delivery room is placed within the operating section, making it possible to utilize the sterilizing room, the doctors' waiting-room, and the other equipment of the operating department in connection with the obstetrical work.

In the *Illinois Central R. R. Hospital,* Chicago, the ward unit is somewhat unusual, as there are no large wards. The greatest number of beds in any ward is four, while the majority of the rooms are for individual patients.

Like some of the other hospitals described, the basement and first floor are devoted to administration and medical treatment, and there are no patients' rooms below the second floor. The entrance lobby is large and generous, giving the would-be patient the idea of hospitality.

On the first floor (Fig. 112), besides the general office, reception rooms, etc., are located the laboratory, the hydrotherapeutic, Zander room, and X-ray room, together with rest room, toilets, etc., for the medical treatment department. On this floor is also located a small out-patient department, with waiting and treatment rooms; also rooms for the internes and chief surgeon.

The kitchen, scullery, diet kitchen, disinfecting room, mortuary, etc., are located in the basement.

The ward utilities are sufficiently isolated from the public corridor. The elevator and staircase-hall are placed in a separate tower.

On the third floor (Fig. 113) is located the operating suite, consisting of three operating rooms, nurses' work room, sterilizing room, anæsthetizing room, utility room, and surgeons' locker room, the surgeons' scrub-up being placed at the end of the main operating corridor. Built-in cabinets, blanket warmers, etc., make this a most complete unit.

The heating plant and laundry are in an entirely separate building.

The demand for a private ward unit in Canada's great hospital, the *Royal Victoria,* in Montreal, has been so great that one of her most generous-hearted sons has provided the means for building a complete and thoroughly equipped private patient pavilion for this institution (Figs. 114-118).

The general plan (Fig. 11) shows the location in connection with the existing hospital. It has been necessary to plan with precipitous grades, and the approach

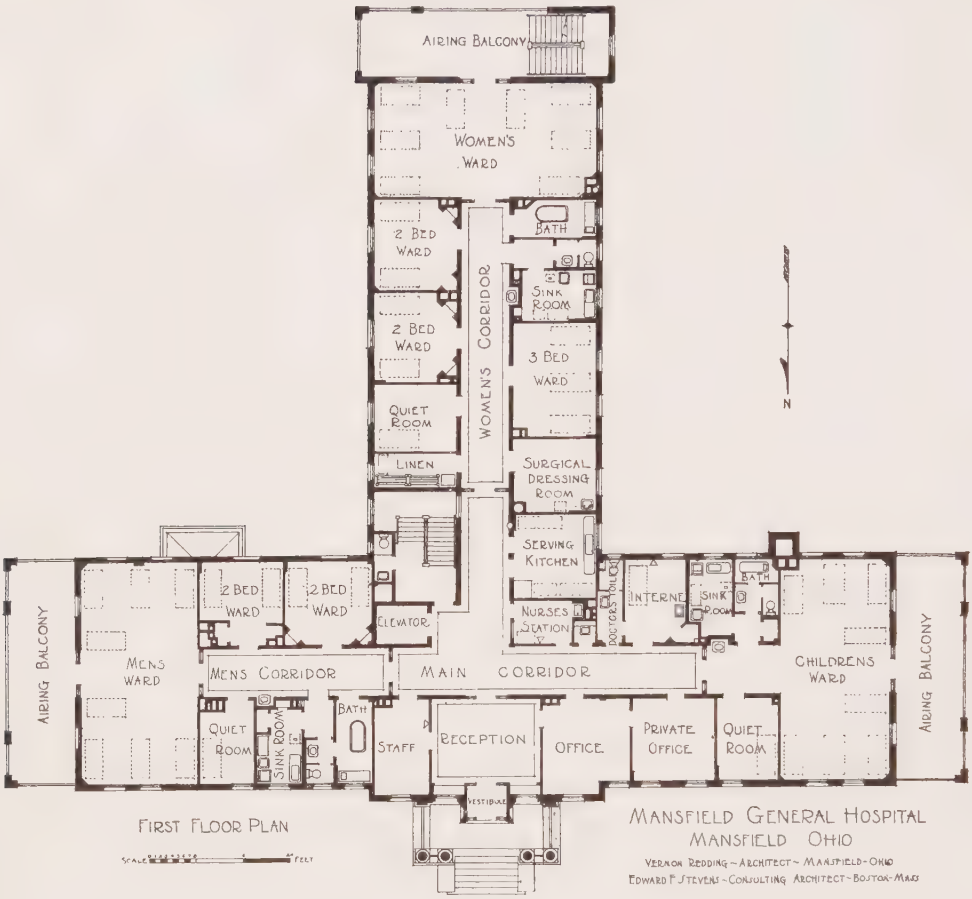


FIG. 110.

to this pavilion from the main hospital is over a bridge from the second story of the original building; thence through the tunnel into the mountain; thence, by means of elevators and staircases, to the various floors of the new pavilion.

While every institution should have its entrance speak "Welcome" to the coming guest, it is doubly important in a building of this kind that much care be devoted to making an entrance commensurate with the object for which the building is erected. The severe hygienic detail which it is desirable to use where surgery and surgical dressings are under way can be abandoned here and the aesthetic side considered. While the question of hygiene should never be lost sight of in any hospital department, the hospital architect should not be a slave to this fancy, but should be able to couple good hygiene with good design.

The medical treatment department (Fig. 142) of this building is as complete as that of any of its kind in America, for the authorities of the hospital realized that the physician should have greater opportunities for his work than are provided in the majority of medical institutions.

The surgical department (Fig. 116) is most complete. The system of lighting is entirely indirect, no lighting fixture being in the operating room, but all concealed behind the glazed ceiling.

Entirely new models of sterilizers were

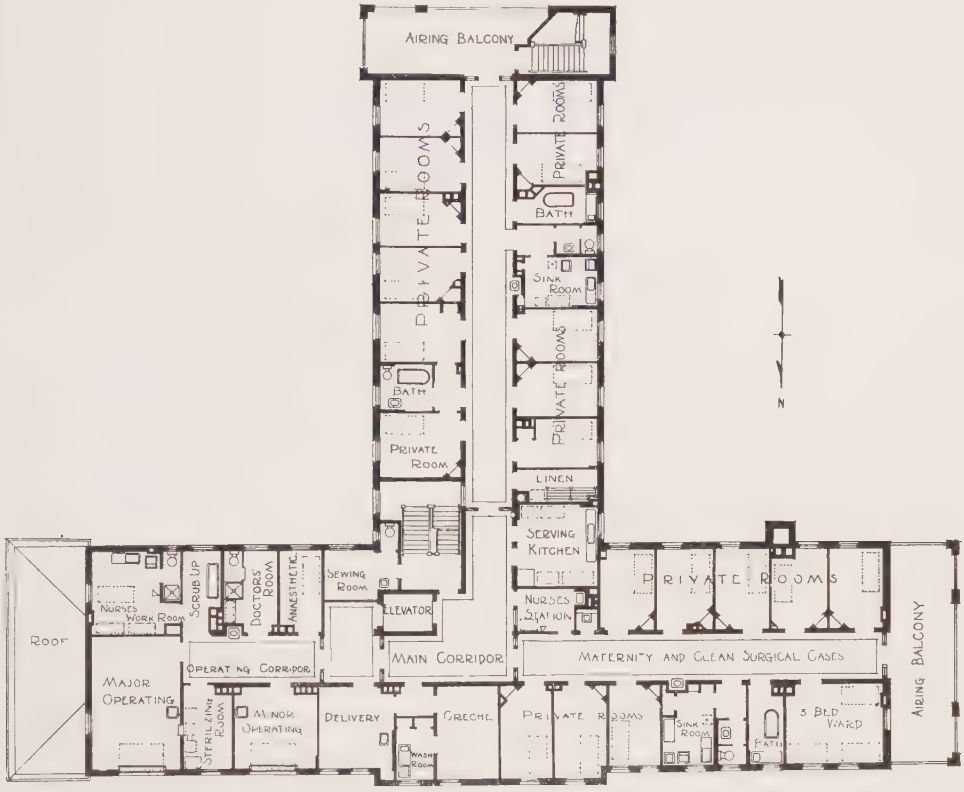


FIG. 111. MANSFIELD GENERAL HOSPITAL, MANSFIELD, O. SECOND FLOOR PLAN.
Vernon Redding, Architect. Edward F. Stevens, Consultant.

designed for this building. Distilled water for drinking purposes is provided on all floors.

A series of balconies from private rooms is arranged on all sides of the building, making it possible for the patients to have their own private balconies, just as they have their own baths and toilets. Additional airing balconies for every floor are provided.

Much of the equipment for Roentgen ray department was especially designed for this building.

Every room has double doors, and all partitions are double, so that one patient shall not disturb another. Each room has its telephone. There are thirty rooms with connecting baths. On the ground floor is a sitting room and a dressing room for special nurses.

The *American Memorial Hospital* (Figs. 119, 119A and 119B), to be built at Rheims, France, will provide for about one hundred beds, with both wards and private rooms. The large wards are divided into two-bed cubicles, thus securing a degree of privacy. There are large porches. The operating department is in its own separate corridor. There are good X-ray and laboratory departments.

As a large part of the smaller hospitals today are being maintained by one or another religious society, it very often follows that the provision for a chapel must be incorporated into the plans of the institution. In the larger institutions, this is provided for by a separate building more or less isolated from the hospital group, but in the smaller institutions it is often considered advisable to have this chapel within the walls of the institution. A practical carrying out of this idea is shown in the plans of the *St. Joseph's Hospital* of Hamilton, Ontario (Figs.

FIG. 112. ILLINOIS CENTRAL RAILROAD HOSPITAL, CHICAGO, ILL. FIRST FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects, Chicago, Ill.

FIG. 113. ILLINOIS CENTRAL RAILROAD HOSPITAL, CHICAGO, Ill. THIRD FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects, Chicago, Ill.

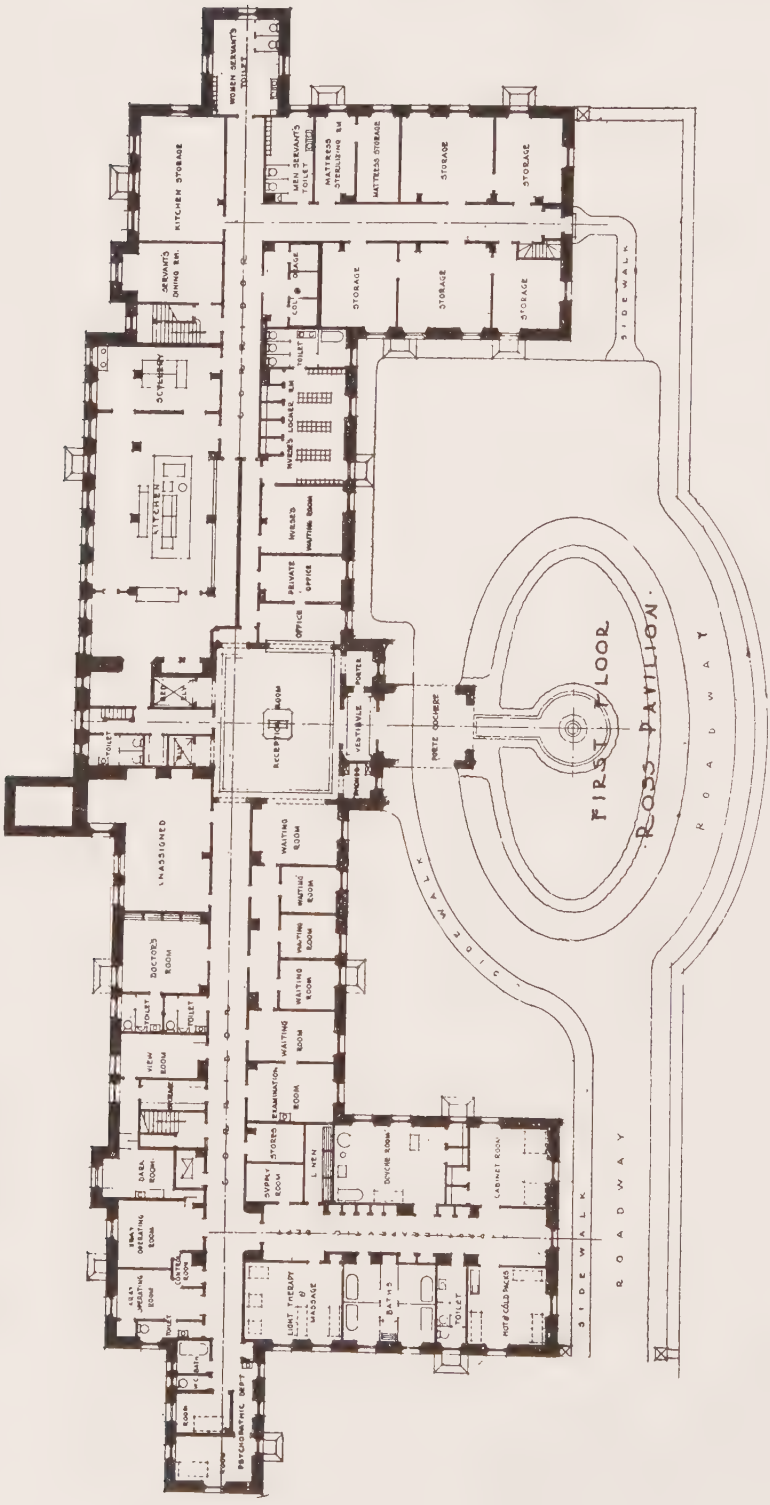


FIG. 114. ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects.

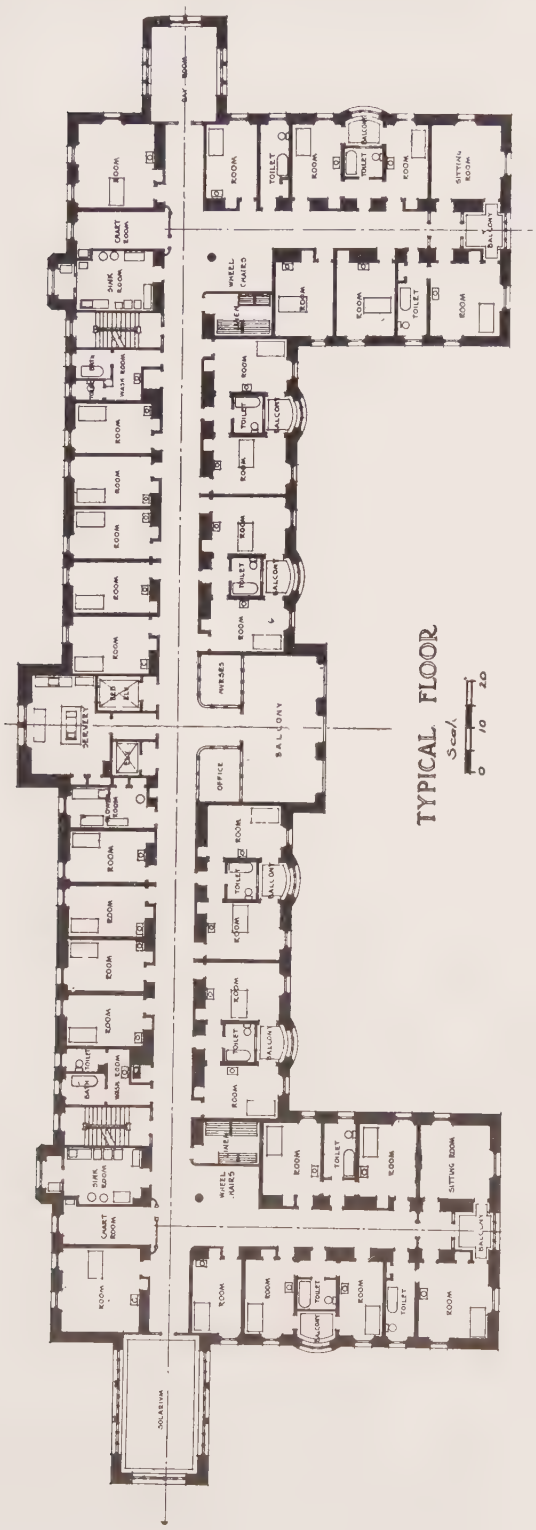


FIG. 115. ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects.

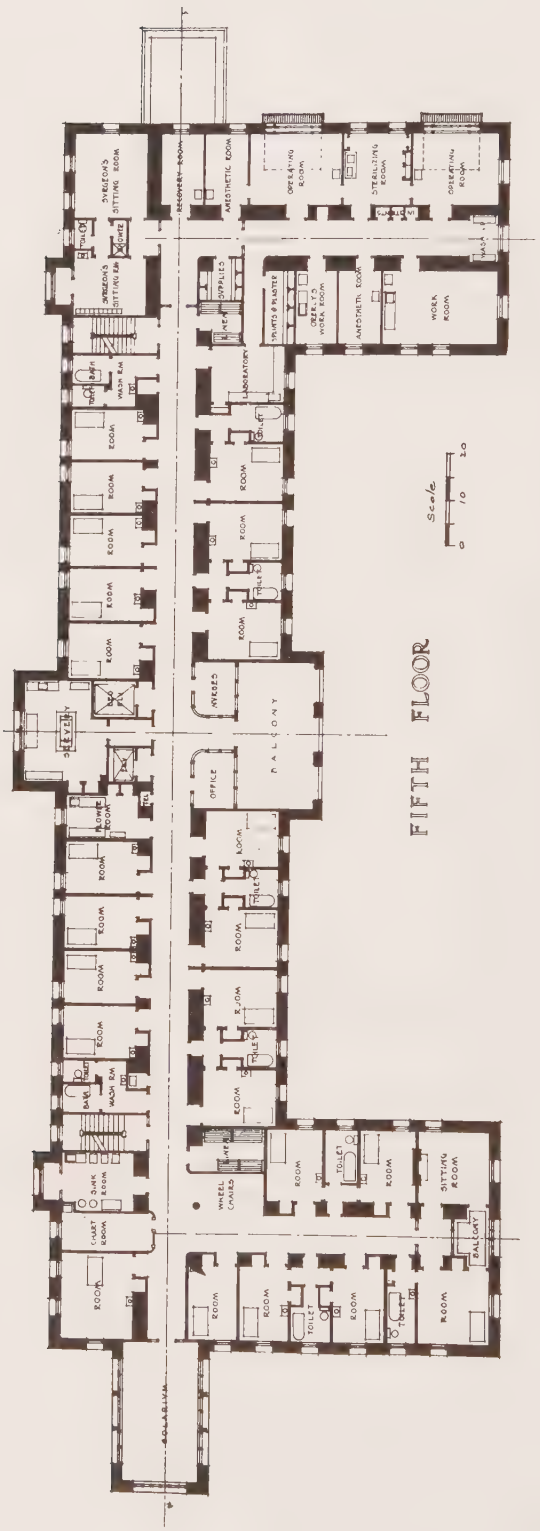


FIG. 116. ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects.

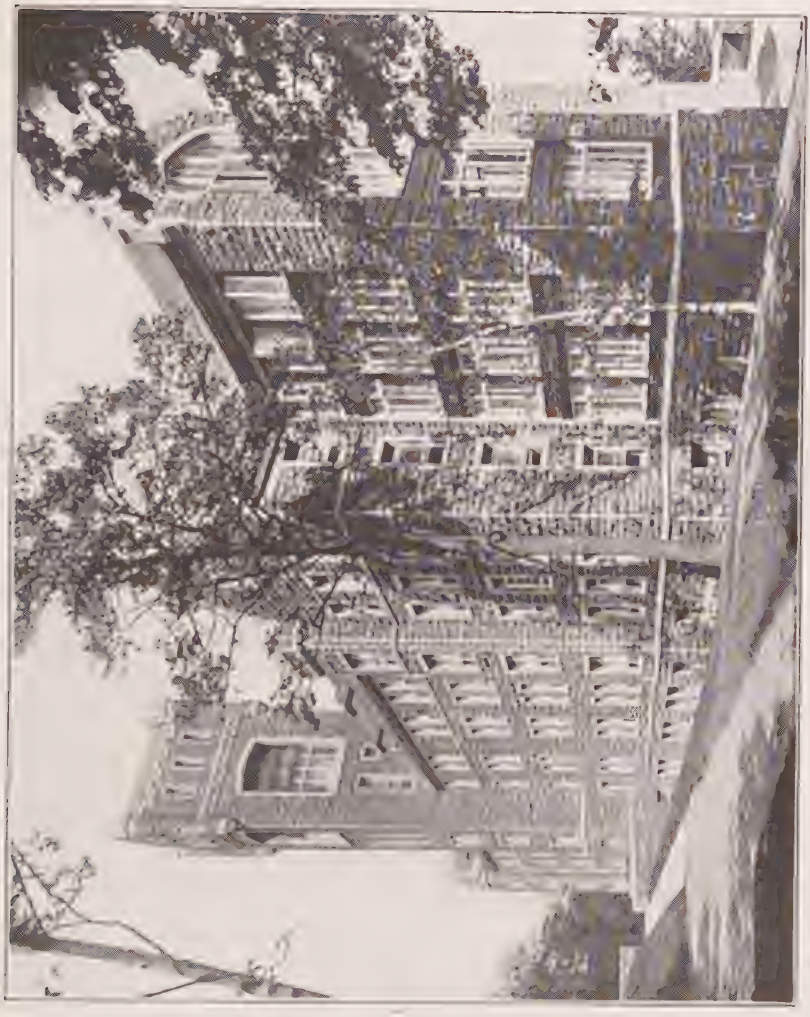


FIG. 117. WEST SIDE, ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects.

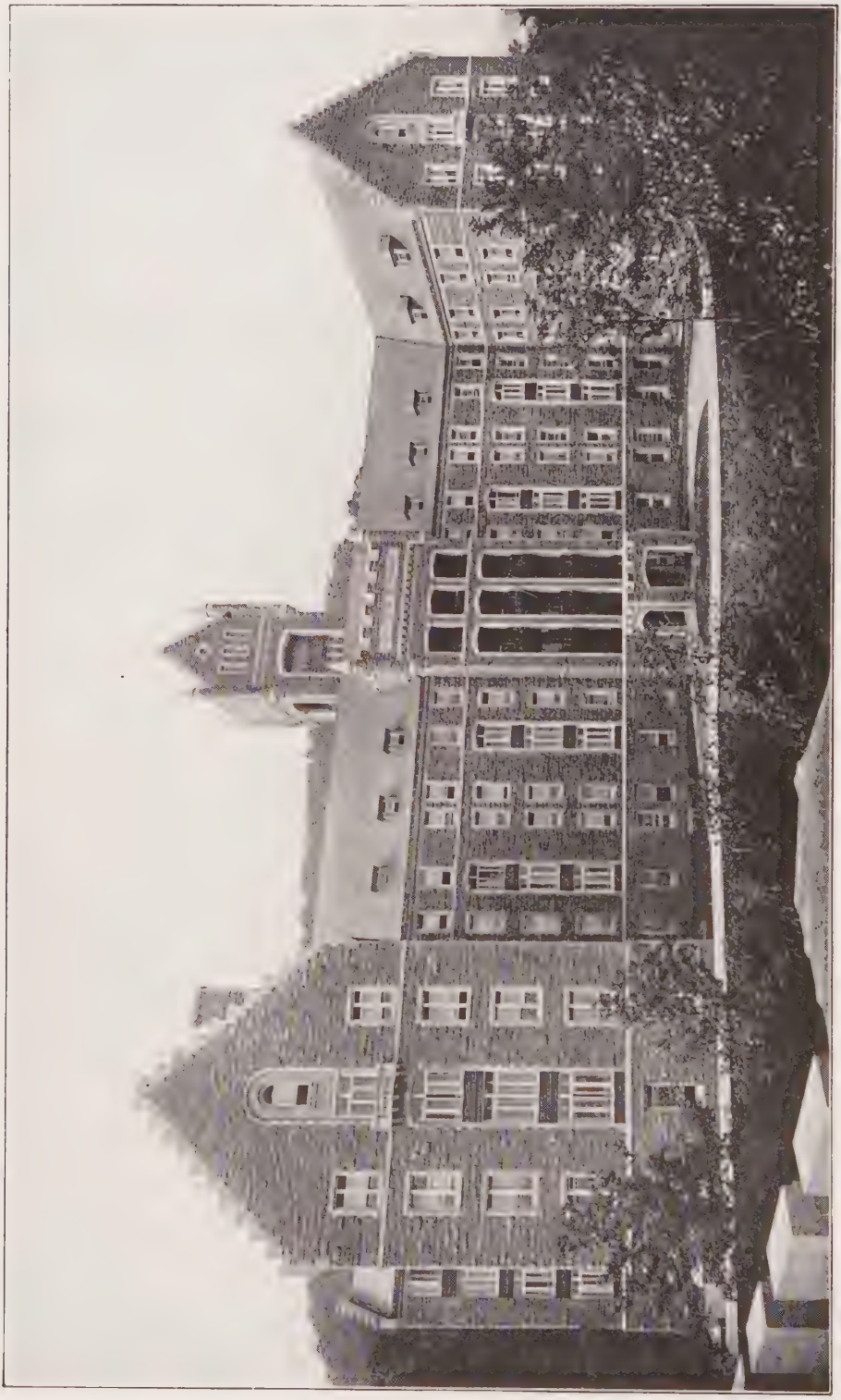


FIG. 118. FRONT, ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects.

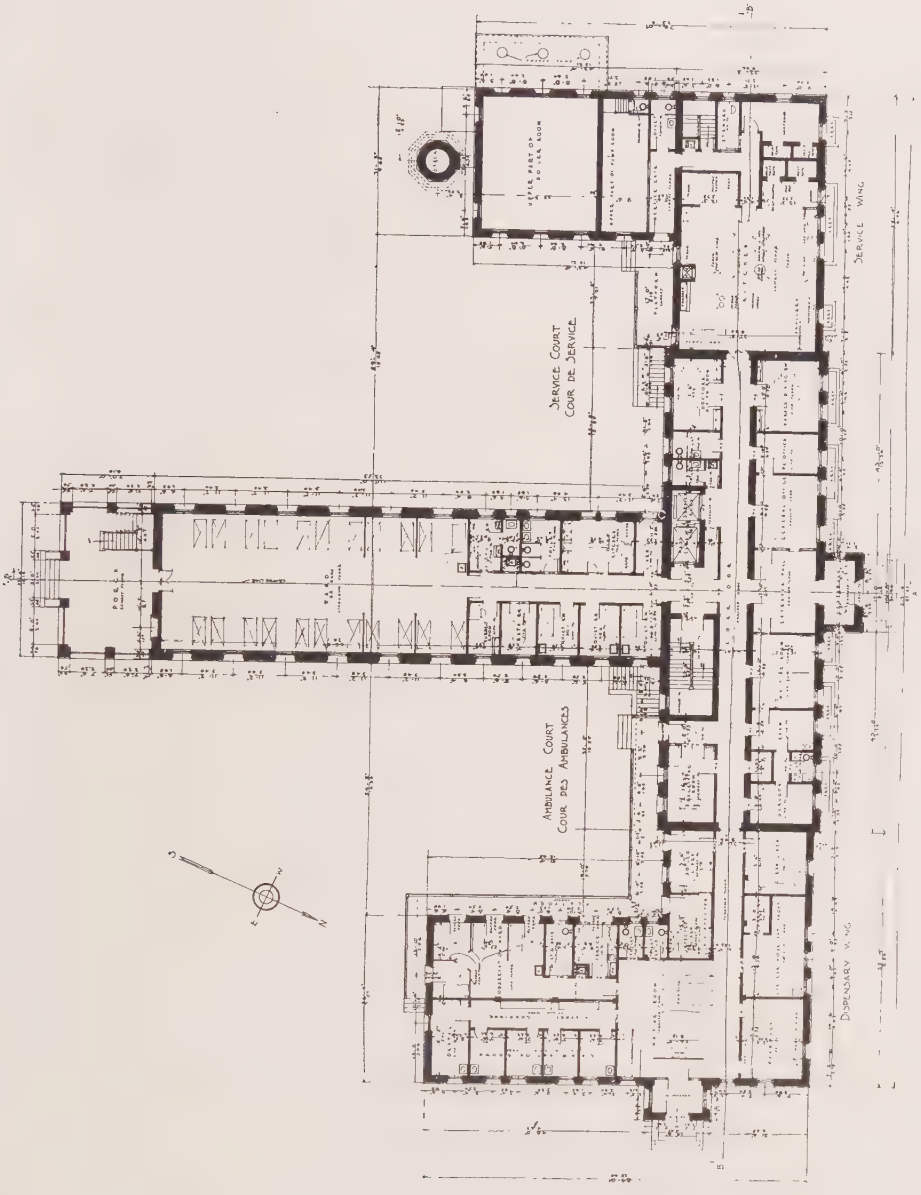


FIG. 119. FIRST FLOOR PLAN, AMERICAN MEMORIAL HOSPITAL, RHEIMS, FRANCE.
Butler & Rodman, Auguste Pellechet, Associated Architects.

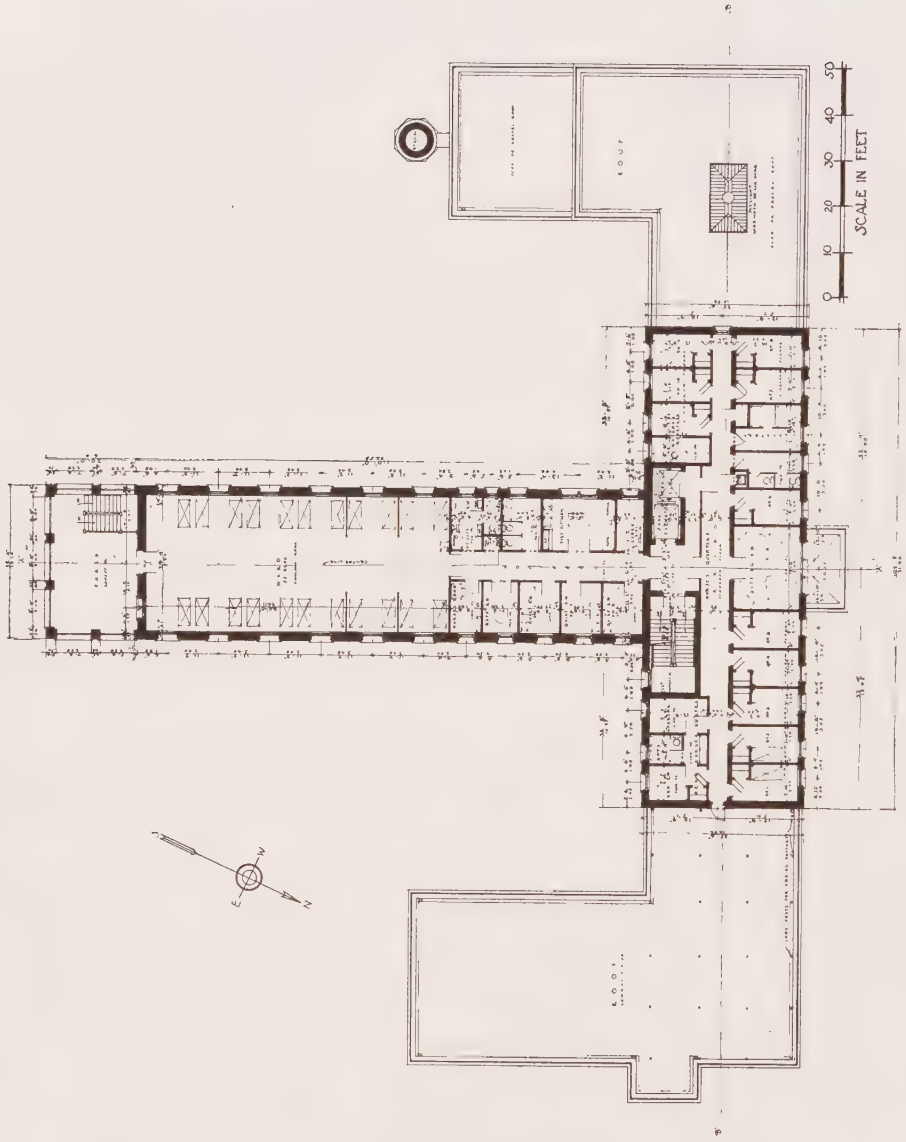


FIG. 119-A. SECOND FLOOR PLAN, AMERICAN MEMORIAL HOSPITAL, RHEIMS, FRANCE,
Butler & Rodman, Auguste Pellechet, Associated Architects.

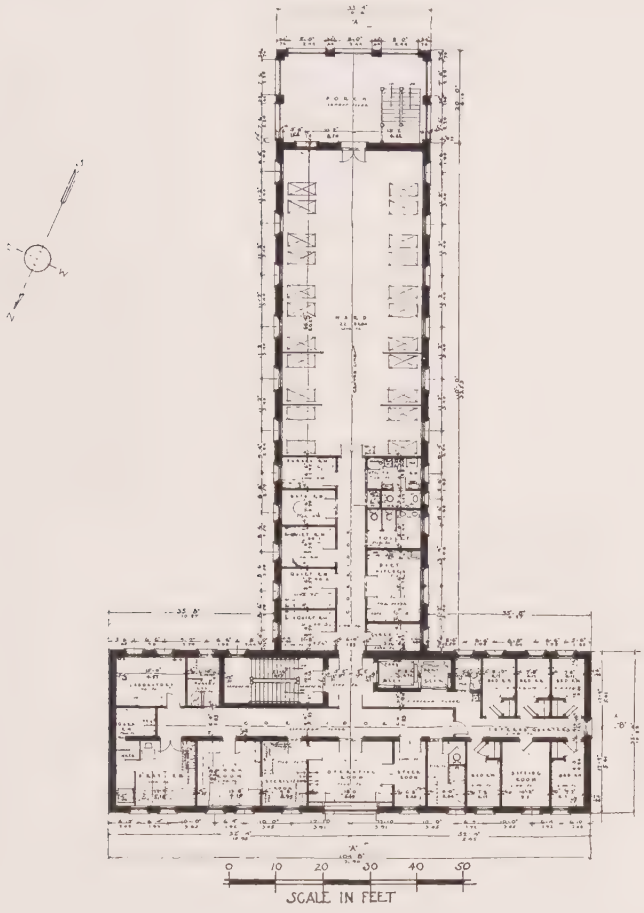


FIG. 119-B. THIRD FLOOR PLAN, AMERICAN MEMORIAL HOSPITAL, RHEIMS, FRANCE.
Butler & Rodman, Auguste Pellechet, Associated Architects.

119D, 119E, 119F, 119G, and 119H. In this surgical building, the ground floor was devoted, as in many other examples, to the kitchen, dining rooms, demonstration, classroom and Roentgen-ray Department. On the first floor at either end of the pavilion are the wards for male and female, together with the service rooms, staircase, etc. In the crossing of the main corridor the chapel is located directly over the kitchen. The second story of this simple plan is devoted to private rooms and the Operating Department.

FIG. 119-C. EXTERIOR, AMERICAN MEMORIAL HOSPITAL, RHEIMS, FRANCE.
Butler & Rodman, Auguste Pellechet, Associated Architects.

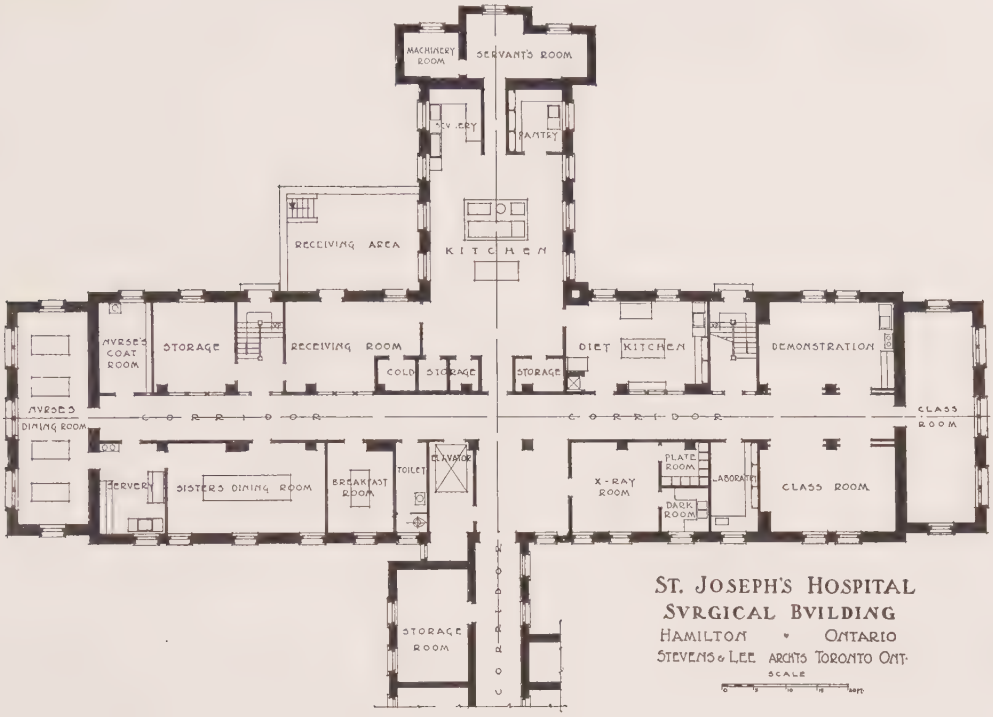


FIG. 119-D. GROUND FLOOR PLAN, ST. JOSEPH'S HOSPITAL, HAMILTON, ONT.
Stevens & Lee, Architects.

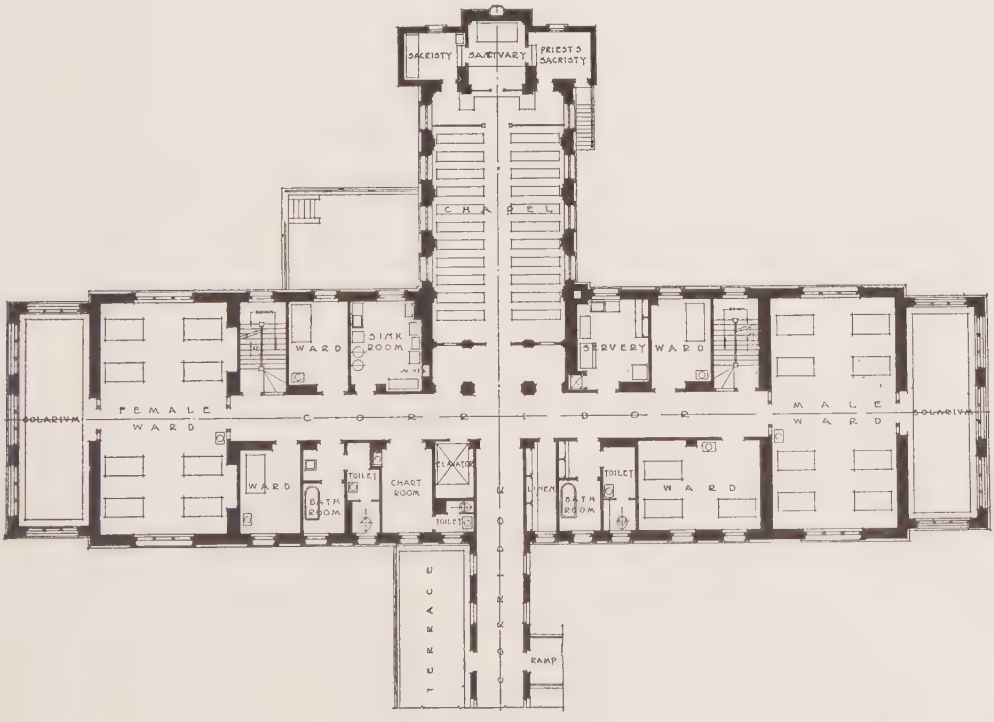


FIG. 119-E. FIRST FLOOR PLAN, ST. JOSEPH'S HOSPITAL, SHOWING CHAPEL, HAMILTON, ONT.
Stevens & Lee, Architects.

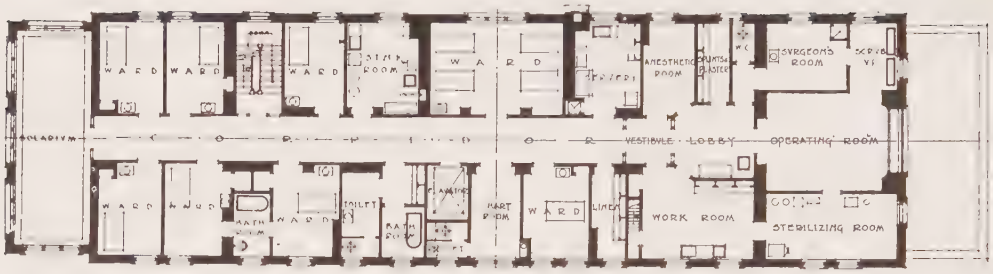


FIG. 119-F. SECOND FLOOR PLAN, ST. JOSEPH'S HOSPITAL, HAMILTON, ONT.
Stevens & Lee, Architects.

FIG. 119-H. CHAPEL, ST. JOSEPH'S HOSPITAL, HAMILTON, ONT.
Stevens & Lee, Architects.

FIG. [illegible]. EXTERIOR, ST. JOSEPH'S HOSPITAL, HAMILTON, ONT., SHOWING CHAPEL.
[illegible]

CHAPTER IV.

The Surgical Department

In American hospitals, the surgical or operating unit takes a greater variety of forms than does the ward unit. It is probable that no one can say with authority that this or that is the ideal arrangement for this important part of the hospital. We cannot take as our model any of the European operating building plans, since conditions there are vastly different. In the German government hospitals, one surgeon will do the majority of the operations and naturally will need but one or two rooms. In our own hospitals, with the large staffs in even those of only one hundred beds, it is not uncommon to find five or six operations going on at once.

In illustration of this point there may be given a few notable examples. The Virchow at Berlin, with its two thousand patients, a large percentage of whom are surgical, has but four operating rooms, one of them for known septic cases. In the Munich-Schwabing, with one thousand beds, there is but one for clean operations. In this country, on the other hand, we find in many comparatively small hospitals a very large proportion of operating rooms. In the Massachusetts General Hospital (Fig. 120), with two hundred and fifty beds, there are five operating rooms, besides those in the accident and orthopedic department. The Grace Hospital at Detroit (Fig. 123), with two hundred patients, has four operating rooms, besides surgical dressing rooms, where minor operations are sometimes performed. In the Youngstown Hospital, with one hundred and fifty beds, four operating and two accident rooms were needed. The Peter Bent Brigham Hospital, with two hundred and twenty-five beds, has three operating rooms. The Bridgeport hospital, with two hundred beds, has three operating rooms.

Our construction is governed largely by the methods of the local surgeons who are to work in any given building. Every year there come new methods in operating, affecting everything from the anesthesia of the patient to his recovery. A building planned to meet the requirements of today may therefore, when finished eighteen months hence, be found lacking in some essential detail. Thus it is that the up-to-the-minute operating unit is well-nigh impossible to obtain.

The operating department should, where possible, be isolated. A separate building is the ideal arrangement. Where this is not possible, the upper story (if there is elevator service) should be used and the department well separated from other rooms.

If the operating department is in a separate building, there should be an admitting room at the ambulance entrance, closely connected with the accident room which should have good north light. These rooms should not connect with anything except the corridor. This accident room can also be used for septic cases.

The day of the amphitheatre in the modern hospital, as an operating unit for teaching, seems to have gone While the amphitheatre is used, of course, for teaching in clinics and lectures, the majority of surgeons have come to the conclusion that in order to gain an intimate knowledge of live tissue the student must be very close to the patient under operation, and smaller and more numerous classes are formed.

For the ordinary operating room an *area* of 300 square feet, or a room about 16 by 20 feet, will very well suffice. All the actual work is concentrated about the operating table, and any space beyond that needed for the surgeons' and nurses' work and for the necessary equipment is more or less wasted. If *observation stands* or balconies are used, the area of the operating room should be increased to accommodate them. (See the Geisinger operating building, Fig. 57.)

The *major operating room* should have no plumbing or other attached fixtures,

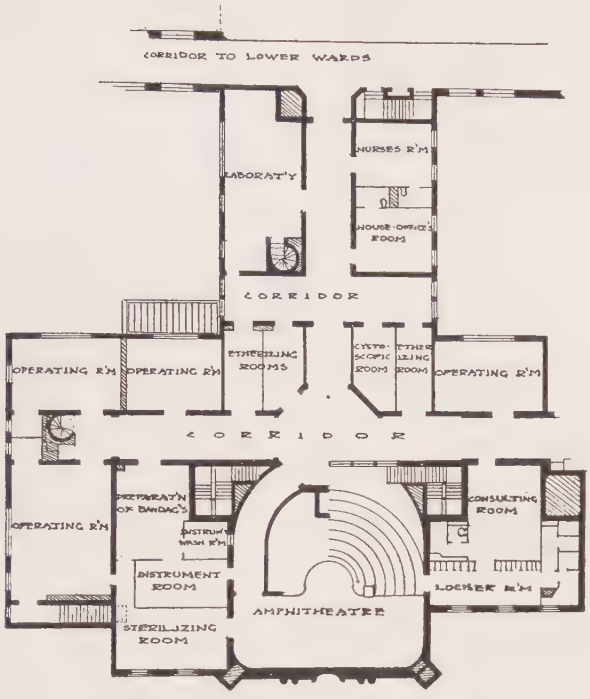


FIG. 120. OPERATING DEPARTMENT, MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.
Wheelwright & Haven, Architects.

except perhaps a flushing floor drain and a sterile water outlet. A small electric instrument sterilizer may be thought desirable, but with the sterilizing room close at hand this is not necessary.

The *heating* of the operating room should be sufficient for any desired temperature within reason. Fresh air should be introduced to make the room comfortable to work in. This can be accomplished in various ways—by the plenum system, where the air is heated and blown in by fans; by gravity, with screens to prevent air from being fouled by dust; and by direct-indirect, with proper air inlets carefully screened.

FIG. 121. OPERATING UNIT, ST. GEORG HOSPITAL, HAMBURG, GERMANY.

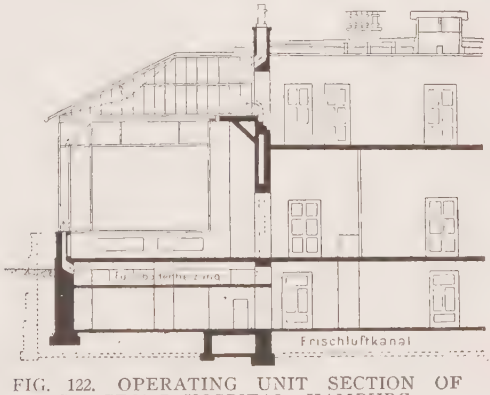
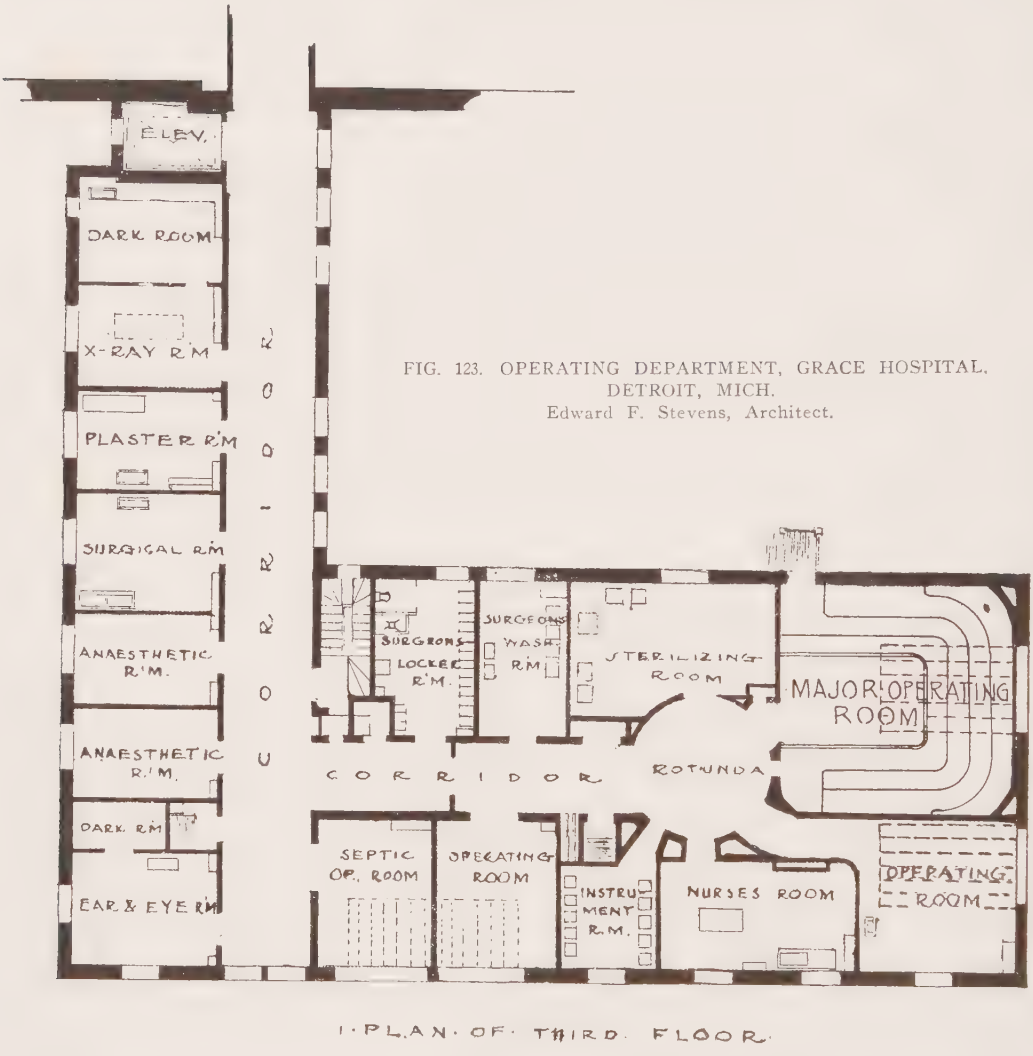


FIG. 122. OPERATING UNIT SECTION OF ST. GEORG HOSPITAL, HAMBURG, GERMANY.



I·PLAN·OF·THIRD·FLOOR·

FIG. 123. OPERATING DEPARTMENT, GRACE HOSPITAL, DETROIT, MICH.
Edward F. Stevens, Architect.

There can be no objection to direct heat, provided the heating units are readily accessible for cleaning, and provided fresh air can in some way be introduced. But the rooms used for operating, sterilizing, and anesthetizing *must* be well ventilated always. (See Chapter XVI, "Heating and Ventilation.")

The *lighting* of the operating room needs careful study, both for day and for night. For the day, large vertical windows and skylight, facing toward the north or as near the north as possible, are best. By carrying the vertical window sufficiently high, practically the same results without skylights are obtained so far as light is concerned—e. g., Macon, Cable Memorial and Williams Hospitals. The glazing, in cold climates, should be double, or with a glass screen as at the Jefferson in Philadelphia, the Bridgeport at Bridgeport, the Royal Victoria at Montreal, etc. The skylight windows may have rolling shades between the two panes of glass in case the light is too strong.

There is much to be said in regard to *artificial lighting*. The crane light has been used successfully, having the advantage of a direct and powerful light

FIG. 124. OPERATING BUILDING, YOUNGSTOWN HOSPITAL, YOUNGSTOWN, OHIO.
Edward F. Stevens, Architect. Stanley & Schiebel, Associate Architects.

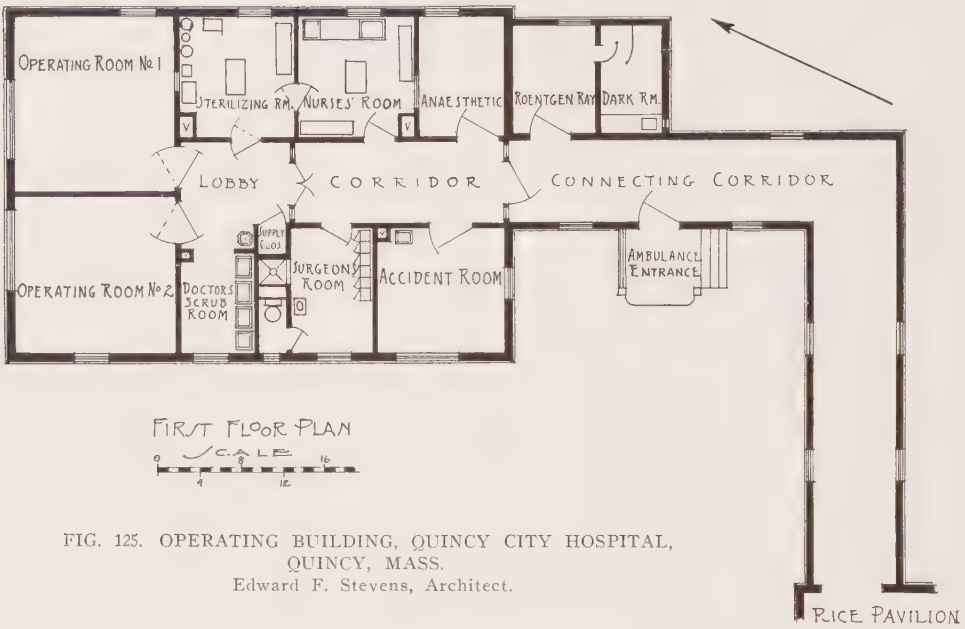


FIG. 125. OPERATING BUILDING, QUINCY CITY HOSPITAL, QUINCY, MASS.
Edward F. Stevens, Architect.

FIG. 126. OPERATING ROOM, QUINCY CITY HOSPITAL, QUINCY, MASS., SHOWING GLASS SLIDE OVER INSTRUMENT STERILIZER.

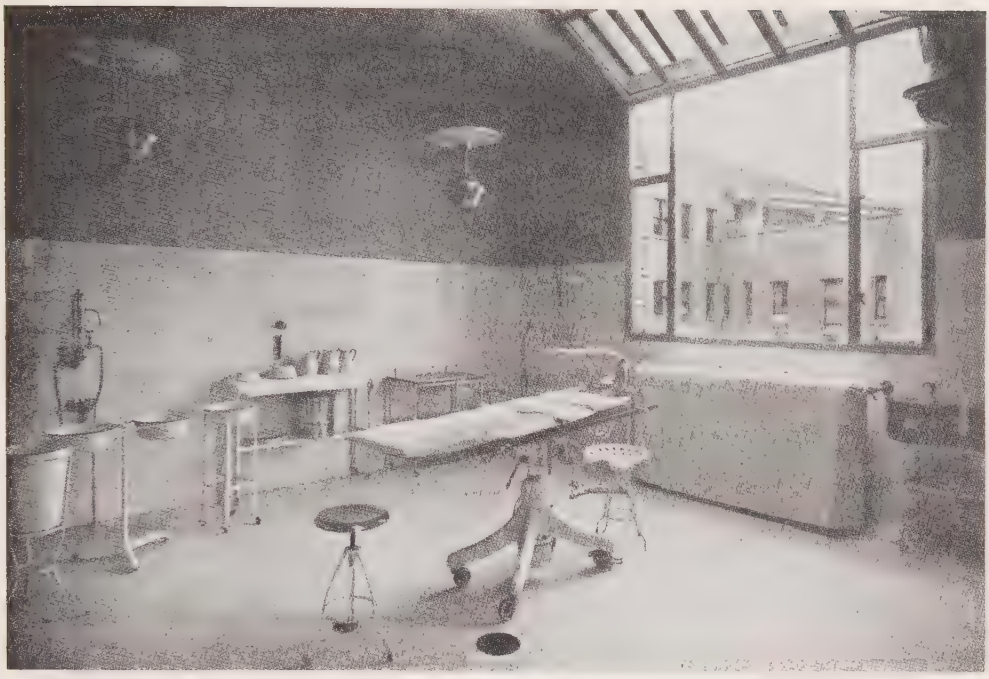


FIG. 127. OPERATING ROOM, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
Edward F. Stevens, Architect.

when needed and of being swung away easily when not wanted. (See Artificial Lighting, Chapter XVII.)

Reflected light from a high power lantern outside the operating room, with fixed reflecting mirrors, has been used with much success. Trouble, however, has been experienced through the vibration of the building, which changed the adjustment.

Reflected lights from numerous fixtures, either with direct reflectors or diffused from the ceiling, have been very successful.

Daylight effect is very desirable in the operating room. There are different lamps and combinations with occasional improvements. The best of today appears to be from high power nitrogen lamps above the ceiling diffused by intervening glass of proper quality.

One can hardly name the *best floor* for an operating room. There are many good materials, such as non-absorbent marble, vitreous tile, terrazzo, and even cement if treated with a non-dusting preparation.

The *walls* of the operating room should either be lined with marble or tile, or finished in hard plaster and thoroughly enamelled. It must be possible to scrub thoroughly or spray with water or steam the entire surface of the walls and floor. To this end, a floor drain of proper construction should be supplied. (See Chapter XVI, "Plumbing.")

It has been found that a clear white tile on floor and walls is too glaring in the intense light of the operating rooms; and gray, buff, and even green have been used with success. Gray Tennessee marble is very satisfactory. Some surgeons have insisted upon having the lower portion of the walls a dark shade of gray, green or even black, the sheets and towels which cover the patient and the gowns of doctors and nurses being of a similar color. It is the writer's usual practice to make the upper portion of the walls a light buff, not far from the color of manila paper, and the lower portion a little darker; this has proved acceptable to some of the leading surgeons.

Next in importance to the operating

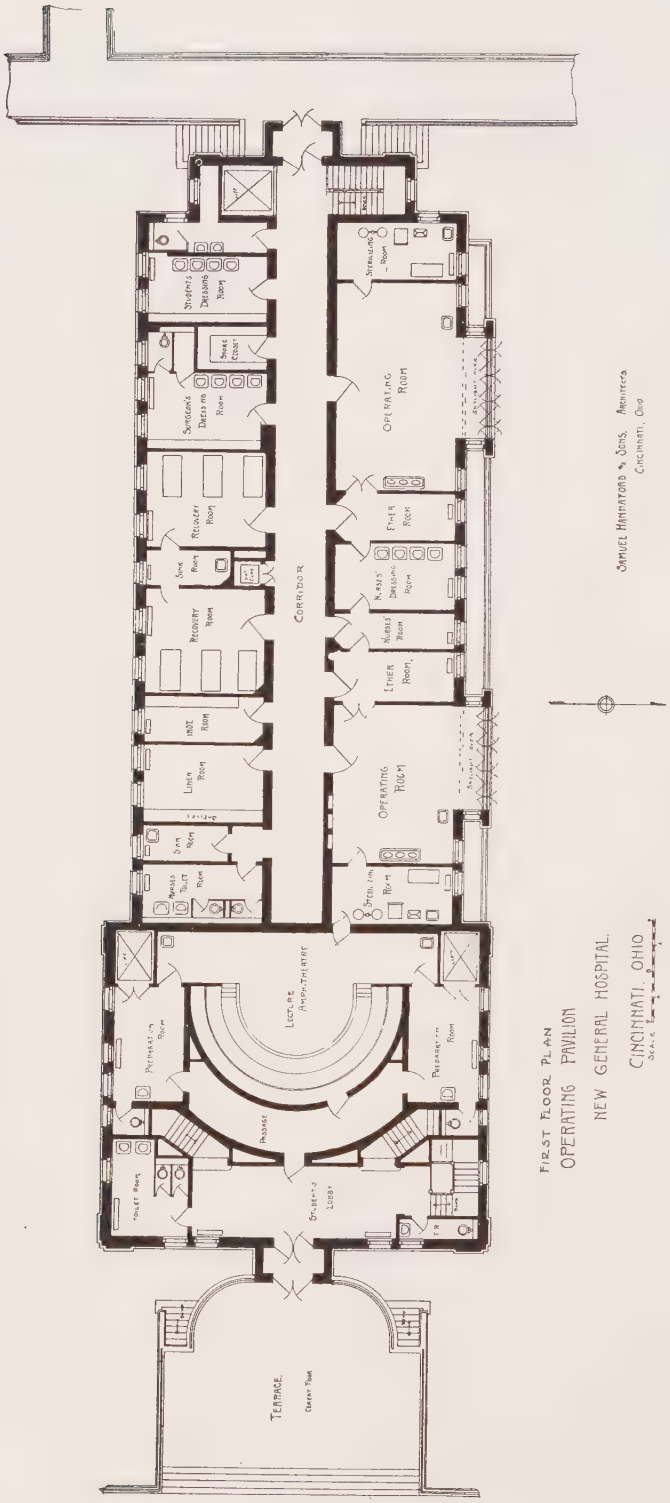

Stretcher Room
Students Dressing Room
Smoke Room
Surgeons Dressing Room
Recovery Room
Sink Room
Recovery Room
Corridor
Linen Room
Bath Room
Sink Room
Bedpan Closet Room
Operating Room
Sterilizing Room
Operating Room
Ether Room
Nurses Dressing Room
Nurses Room
Ether Room
Operating Room
Sterilizing Room
Operating Room
Lecture Amph. Theatre
Preparation Room
Preparation Room
Toilet Room
Terrace
Samuel Hannaford & Sons, Architects
Cincinnati, Ohio
First Floor Plan
Operating Pavilion
New General Hospital
Cincinnati, Ohio
Scale

FIG. 128.

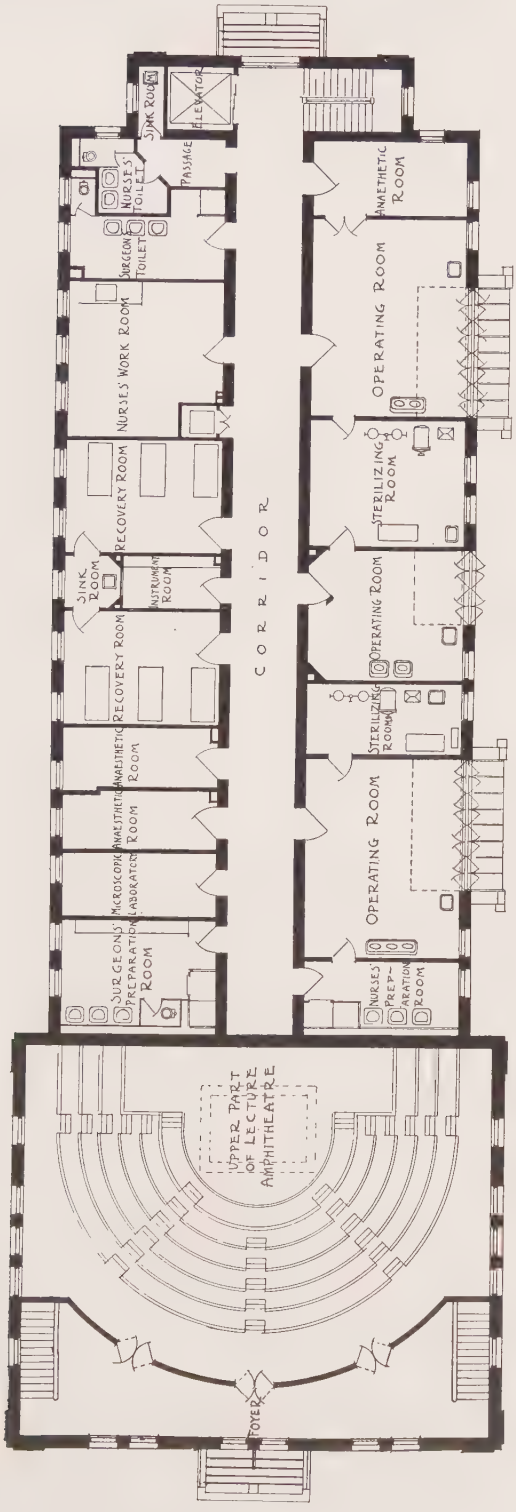


FIG. 129. SECOND FLOOR, OPERATING PAVILION, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

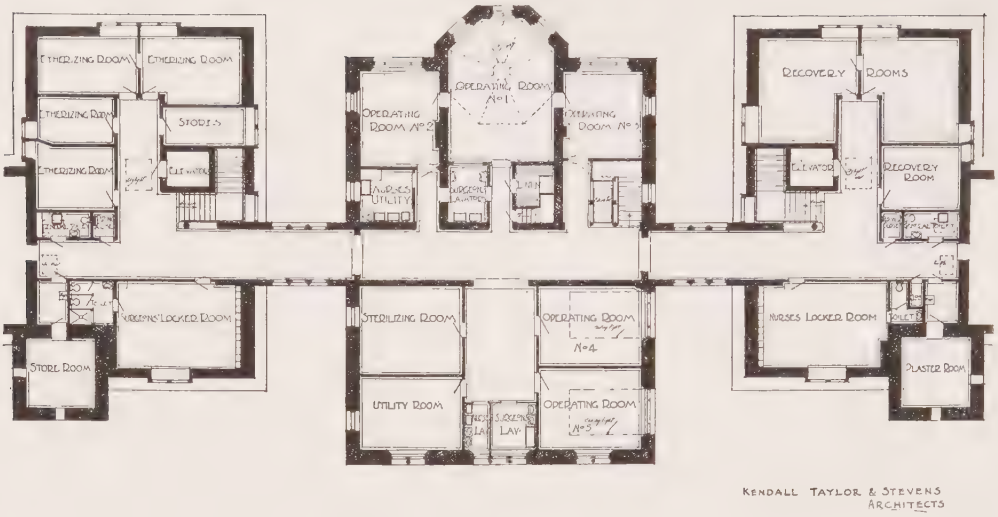


FIG. 130. OPERATING SECTION, RHODE ISLAND HOSPITAL, PROVIDENCE, R. I.
Kendall, Taylor & Stevens, Architects.

room is the *sterilizing room*. This need not be large, but should be specially ventilated; all exhaust steam pipes should be extended into the open air; and if a hood can be placed over the sterilizer, it should be done. It is advisable to place the water sterilizers or still at an elevation, so that the sterile water may flow to each operating room and, by the use of reheaters, be heated by steam or electricity. Such reheaters should be provided with elbow control valve and the discharge nozzle protected from contact by a metal or glass hood. A proper receptacle, like a porcelain sink, properly trapped, should be placed under the reheater.

The *nurses' workroom* should be large enough for the corps of nurses needed, should be provided with tables for making up dressings, with sinks, slabs for cleaning instruments, special scrub-up bowls for the clean nurses, cabinets for sterile and unsterile dressings, etc.

The small *laboratory* for quick diagnoses is considered a necessary part of the operating suite. It should be well provided with apparatus for making rapid microscopic examinations of tissue while the patient is still on the table.

There should be a surgeons' room or rooms, of sufficient size, supplied with a locker for each surgeon, comfortable furniture, shower bath and toilet. The instrument room may have a locker or compartment for each surgeon's instruments. Anaesthetizing rooms, well ventilated, should be sufficiently screened from the operating corridor, yet near the operating rooms, and should have doors of ample width to admit a bed, with jambs and doors protected by metal.

The scrub-up sinks should be either in the corridor or in an open alcove without doors near the operating room where there will be plenty of room for all to work without interference, and with plenty of shelf room for soap, brushes, etc.

The details of finish and equipment, the plumbing and heating of the operating suite will be taken up in later chapters.

The operating department of the *St. Georg Hospital* (Fig. 121) at Hamburg is one of the most carefully worked out, so far as hygienic detail is concerned. Strict attention is given to the heating and ventilation (Fig. 122); the air is washed and filtered before entering the room, and the direct heating units are entirely outside the walls. The equipment is most carefully designed.

In the operating department of *Grace Hospital,* Detroit (Fig. 123), there are

three rooms for clean surgery, besides the septic, surgical dressing, and plaster rooms. The surgeons' locker and dressing rooms are outside the clean portion of the department. Here the room for scrubbing up is not connected with the locker room. There is a large sterilizing room and a larger room for the nurses' work of preparation; also an instrument room where each surgeon has his own compartment in the instrument case, etc.

The operating building of the *Youngstown Hospital* (Fig. 124), Youngstown, O., is two stories in height, and is divided into two sections—the accident and the operating proper. The accident department, on the ground floor, gives access for ambulance patients; the elevator reaching the first floor level. On the ground floor are the receiving and waiting rooms, the two accident rooms, laboratories, morgue and store rooms. On the first floor are the operating rooms, with two anesthetizing rooms, which are placed in the center of the building, with skylights, and are entered either from the main corridor or from the operating corridor. This makes it unnecessary for the patient to enter the operating corridor until anesthetized. The three clean operating rooms open from a ten-foot corridor, in which are the surgeons' scrub-up bowls, so placed that six men may scrub at once. A septic operating room is provided, a large sterilizing room, a large work room for nurses, instrument room and a small laboratory.

Sterile water is brought from a central apparatus to each operating and accident room, and there heated locally by electricity.

The *Quincy City Hospital* (Figs. 125 and 126), Quincy, Mass., is a small institution with a capacity for fifty beds, but its operating department is in a separate building. In this, all the essentials have been provided. The accident and Roentgen-ray rooms and surgeons' room are removed from the clean corridor.

At the *Ohio Valley General Hospital*

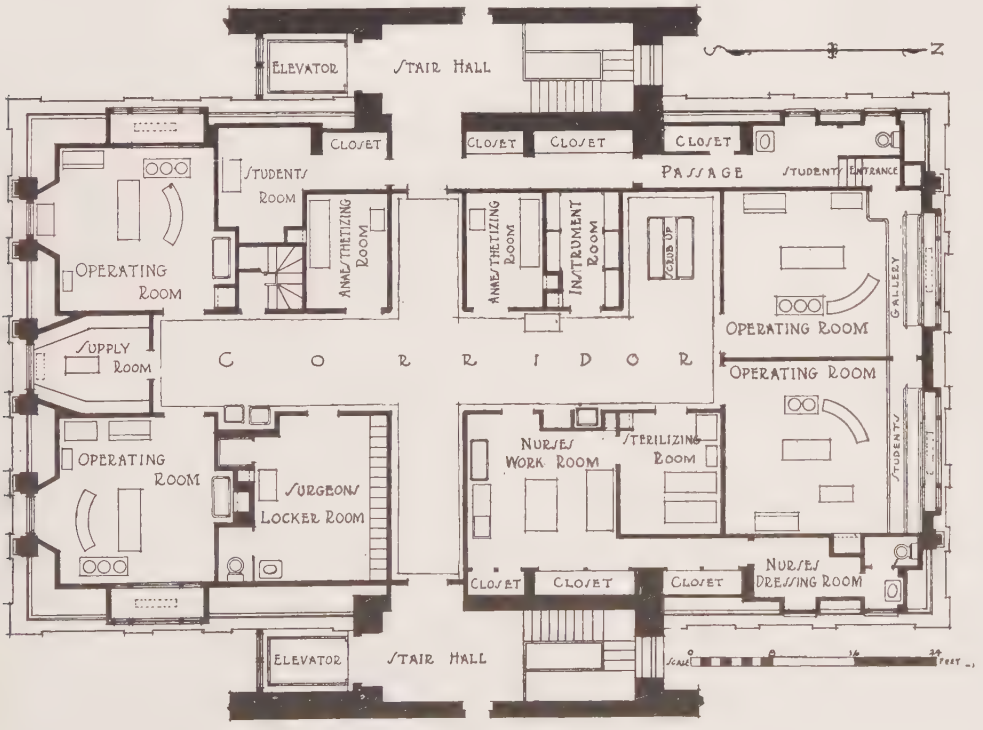


FIG. 131. OPERATING DEPARTMENT, NEW YORK CITY HOSPITAL, NEW YORK, N. Y.
Charles B. Meyers, New York, and Edward F. Stevens, Boston, Architects.

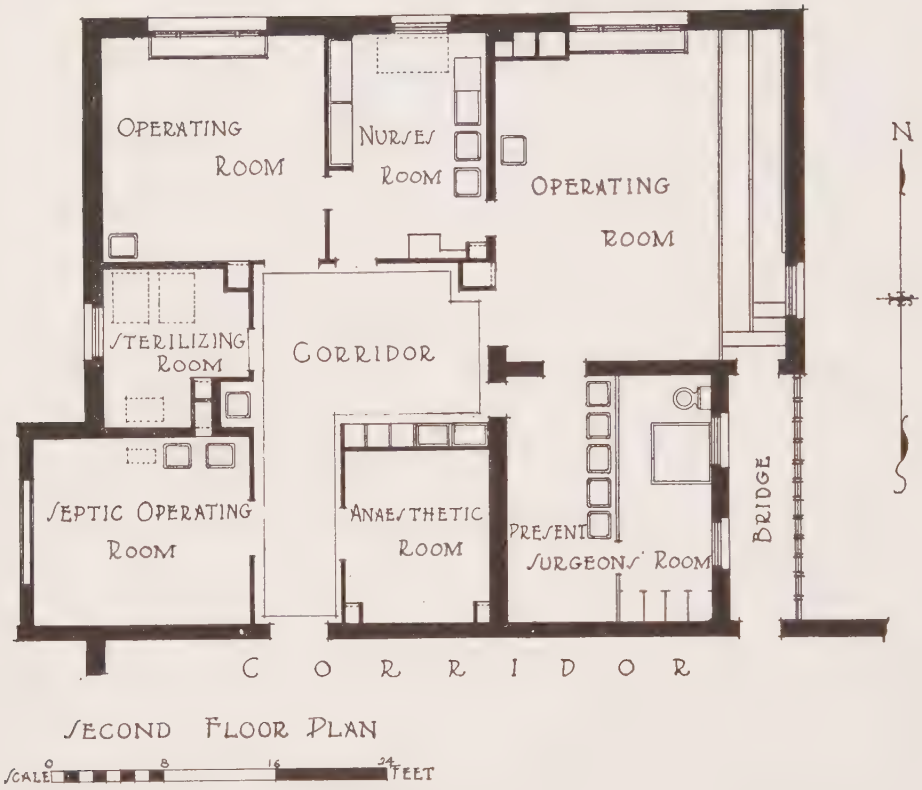


FIG. 132. OPERATING DEPARTMENT, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.
Edward F. Stevens, Architect.

one wing of the fifth floor is set apart for the operating department, with one septic and two clean operating rooms (Fig. 102). The scrub-up basins are placed in the center of an open cross corridor, accessible from all sides. Sterilizing room, nurses' work room, surgeons' and anesthetizing rooms are placed conveniently for service. Distilled water from a supply tank in the tower furnishes sterile water for the operating, accident, maternity, and laboratory departments.

The operating pavilion of the *Cincinnati General Hospital* (Figs. 128 and 129) is most complete, each operating unit having its own anesthetic room adjoining and recovery room close at hand. The necessary nurses' work rooms, dressing, instrument, and laboratory rooms are provided.

The lecture amphitheatre, while in the same building, is not directly connected, but is reached through the lower level and approached by two elevators and staircases.

In the private patients' building of the *Buffalo General Hospital,* Buffalo, N. Y. (Fig. 53), there are two major operating rooms, each with an anesthetizing room adjoining; the sterilizing room is between them. The nurses' work room and a minor or eye operating room open off the same corridor, in the ample space of which are the surgeons' scrub-up sinks. A plaster room, the surgeons' room and the nurses' locker room open from an adjacent corridor. The instrument cabinets are built into the construction.

In the operating building of the *George F. Geisinger Memorial Hospital,* Danville, Pa. (Fig. 57), the rooms are grouped about an octagonal rotunda, in the center of which is the surgeons' scrub-up, form-

ing a decorative feature. The walls of the rotunda are of marble, with cases for the instruments set into niches on four sides. There are three operating rooms, one of which can be darkened for eye work. The observation stands in these rooms are approached from separate corridors, making it unnecessary for students or visitors to pass through the operating room. A window from this special corridor also permits observation from that point. Each operating room has its heating unit vestibuled between the inner and outer window sashes. In these same vestibules are refrigerating pipes for reducing the temperature in summer.

The sterilizing room for instruments and utensils opens directly into the two operating rooms; a separate sterilizing room for dressings is provided. Distilled water is piped to each operating room. There is a small laboratory and ample storage space for linen and supplies. The admitting room for accident cases is located near this department.

It will be observed that doors have been dispensed with throughout the department wherever possible.

In the *Ottawa Civic Hospital,* Ottawa, Canada (Fig. 84), the surgical department occupies practically the whole of the sixth floor. There are four major operating rooms and one for eye work. The sterilizing room is in two sections, for facility of service; the instrument room is directly off the instrument sterilizing room. There is a separate room for plaster work, and a large work room. Special features are the separate dressing rooms for the house and attending staff, as well as the one for the nurses. There is a waiting room for the relatives of patients.

In the *Notre Dame Hospital,* Montreal (Fig. 92), there are two major operating

FIG. 133. BUILT-IN CASES, OPERATING DEPARTMENT, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.
Edward F. Stevens, Architect.

rooms with a sterilizing room between them, an eye operating room, and a plaster room. The scrub-up is in the rotunda, and around this rotunda centers the service. There are three anesthetizing rooms, near the elevator, opening on a special corridor. The surgeons' room is at the left of the staircase; there is a large work room, ample storage space for made-up supplies, a dressing room for the nurses, and a small emergency laboratory.

In the *Hamot Hospital,* Erie, Pa. (Fig. 50), nearly the whole of the top floor is devoted to the operating department. The two larger operating rooms are on their own corridor. The delivery room is situated here, also a room for plaster work. There is a sink room and serving kitchen next the roof garden, so that it may be used for the outdoor treatment of cases which require it.

In the *Reid Memorial Hospital,* Richmond, Ind. (Fig. 94), all the rooms of the operating department are arranged about a central rotunda, thus giving quick service, no matter what the combination of events.

Remodelled Operating Departments. It is quite common, in modernizing an old hospital, for the provision for the operating department to be somewhat limited; and it is not an unusual thing for the attic story, which has been used as kitchen or servants' quarters, to be turned over to the architect to make into a modern operating department. Two or three examples of this may be helpful.

In the *Rhode Island General Hospital* (Fig. 130), at Providence, an unused upper story was utilized, providing five good operating rooms, and all the conveniences of a modern surgical unit.

In the *New York City Hospital* (Fig. 131), *Blackwell's Island,* the dome of the old building, formerly used as a kitchen, was so reconstructed as to meet the needs of the surgeons. The structures of the roof trusses made the planning more difficult, and the spaces which would in an ordinary case be used as operating rooms were very conveniently turned into nurses' and students' locker rooms and entrance to student's gallery (in no sense an amphitheatre). Sky-

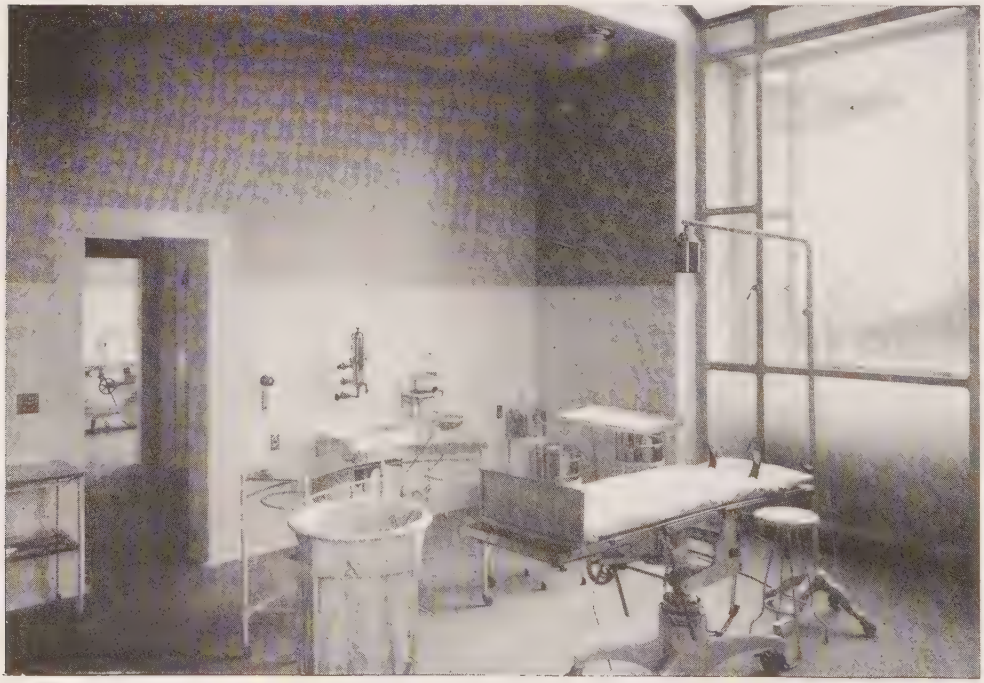


FIG. 134. MAJOR OPERATING ROOM, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.
Edward F. Stevens, Architect.

FIG. 135. OPERATING ROOM, DR. WILLIAMS' PRIVATE SANATORIUM, MACON, GA.

lighting of all rooms was practically necessary. Four operating rooms are provided, only two of which could have the north exposure. Here again distilled water is made at an elevation, and conducted to the various rooms.

At the *Bridgeport Hospital* (Fig. 132) the case was slightly different. An old operating theatre, with a small addition, was turned into three modern operating rooms, with sterilizing, instrument and work rooms. Entrance for students to the major operating room was secured by a gallery from the main corridor.

Built-in cabinets (Fig. 133), distilled water reheaters, and specially designed equipment make this a very complete department.

FIG. 136. MAJOR OPERATING ROOM, BARRE CITY HOSPITAL, BARRE VT.
Edward F. Stevens, Architect.

CHAPTER V.

Medical Treatment Department

The fact is recognized more and more every year that many diseases and ailments which have hitherto been considered surgical cases or which have been neglected altogether can now be treated without surgery and with little medicine. The medical treatment or bath department, as it is called in European countries, is gradually being introduced into the general hospital plan. The hospital boards in this country have given little thought to this department, but in the larger European hospitals one will find the medical units with such sections as

Mechano-therapy.
Hot air baths.
Warm air baths.
Steam baths.
Light baths.
Electric baths.
Gas baths.
Radium baths.
Sand baths.
Sulphur baths.
Mud or peat baths.
Sun baths.
Inhaling and pneumatic chambers.
Roentgen-ray treatment.

Today a careful student of hospital architecture will not dare to plan for a complete layout without providing facilities for some medical treatment, if it is nothing more than a few electric-light bakers. It may include hydrotherapeutic apparatus of various sorts, facilities for giving electric current or electric light treatments, massage, mechano-therapy, (gymnasium or Zander), X-ray treatments, etc. We should no longer give to the surgeon and the obstetrician all the best rooms of our hospitals, but should provide space for the present and the future for internal medicine and therapeutics.

To the student of hospital architecture the question naturally arises: If these methods of treatment are essential for the well-being of the poor and indigent across the sea, why should we not practice them, or some of them at least, in our institutions?

The hydro-electric bath, the carbon dioxide bath, the plunge, and those previously mentioned, are but a few of the examples one will find in the general public hospitals of Europe. Reference is not made to the various sanatoriums one finds over all the world, but to the general hospitals for the care of the poor and indigent. Should we not, in America, provide such equipment that the patient suffering from arthritis, chronic rheumatism, or cellulitis, let us say, may have the proper mechanical, electrical, heat and massage treatment, or the water-bed for severe bodily burns or sores?

It is not necessary to have a five-thousand dollar, complete hydro-therapeutic outfit; but room can be secured in every hospital for a small equipment—an electric baker, massage table, small vapor bath, etc.—and many simple home-made devices can be brought into use, if the medical student of today will only prepare himself to use them when he comes to be on the hospital staff of the future.

Heat is an important therapeutic agent, whether it is applied by warm air, steam, electric light, or natural sunlight; scientifically applied, it is a recognized medium for benefiting man's ills.

If heat applied by the direct rays of an arc light has a higher therapeutic value than when applied by any other method, then this should be recognized and the equipment supplied. If the hot air bath will relieve pain when nothing else will, then this should be recognized. As the study of non-surgical methods for relieving suffering advances, hospitals should be prepared to provide the proper treatment.

The airing balcony provides sunlight for the medical as well as for the surgical patient. The simplest, and many times the most potent agency, *sunlight*,

can easily be provided in every institution.

In discussion with various medical specialists, they have acknowledged the value of equipment and recommend it where possible, especially the full-length continuous bath or water-bed, the hydrotherapy and baking. In designing a new hospital there should be set apart certain rooms to be reserved for medical treatment rooms, for within a very short time the medical men will demand more equipment.

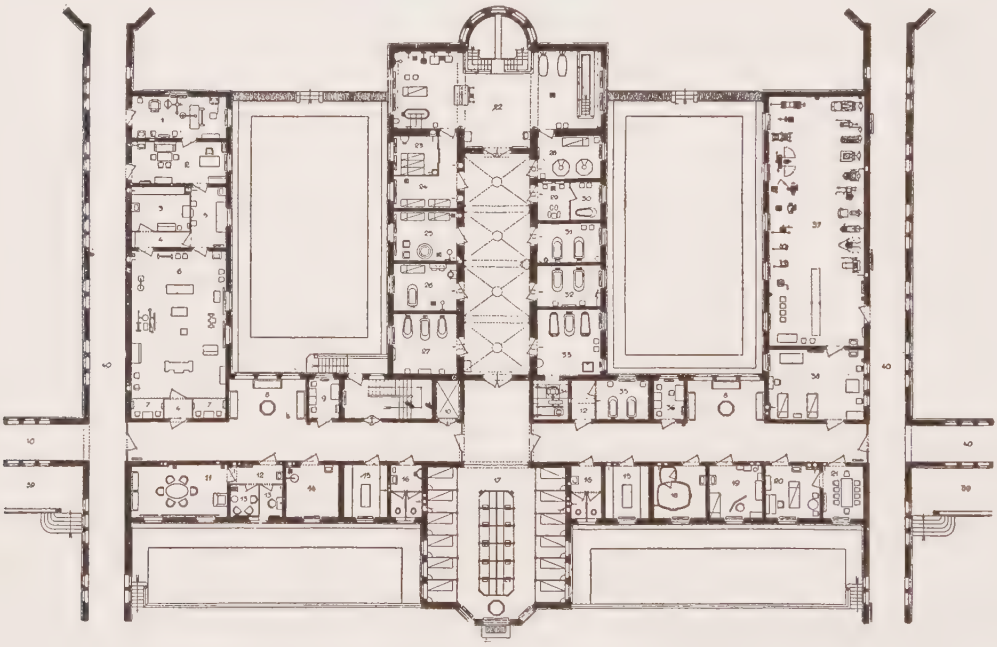
The help given by scientific treatment to the so-called chronic invalids in some of the medical departments of the newer hospitals is referred to as little short of miraculous.

To illustrate what some of the later European hospitals are doing in the line of medical equipment, a few examples are here shown.

The Virchow, at Berlin, devotes even more room to the medical treatment department than to the surgical.

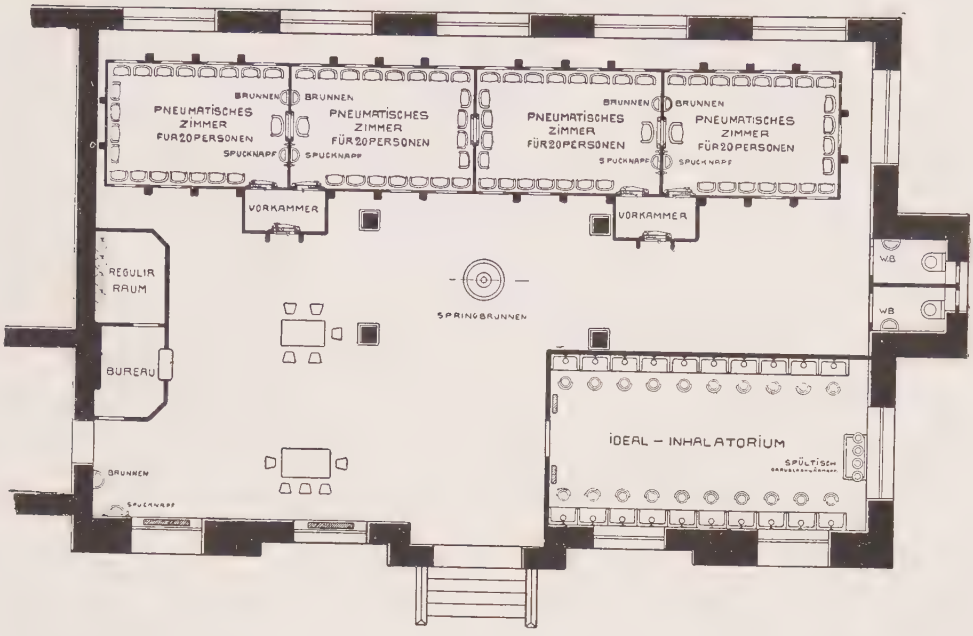
At the Barmbeck, Ruppel's latest hospital, at Hamburg, the bathhouse is given the place of honor on the main axis, while the operating pavilion occupies a secondary position.

The Bispebjerg, at Copenhagen, among the newest large Scandinavian hospitals, has devoted a large space to this department, which is entered by semi-underground passages.



1. Roentgen therapeutics.
2. Physicians' room.
3. Dark room.
4. Light shaft.
5. Photograph laboratory.
6. Roentgen room.
7. Undressing room.
8. Waiting room.
9. Attendants' room.
10. Elevator.
11. Social room.
12. Ante-room.
13. Segregated room.
14. Light bath.
15. Wash room.
16. Toilet.
17. Rest room.
18. Pneumatic room.
19. Examination room.
20. Physicians' room.
21. Ante-room.
22. Douche room.
23. Hot air bath.
24. Warm air bath.
25. Vapor room.
26. Fango mud bath.
27. Mud bath.
28. Heat bath.
29. Four-cell bath.
30. Electric water bath.
31. Gas bath.
32. Salt water bath.
33. Sand bath.
34. Sand room.
35. Sulphur bath.
36. Female attendants' room.
37. Therapeutic gymnastics.
38. Masage room.
39. Rest room.
40. Hallway.

FIG. 137. GROUND FLOOR PLAN, MEDICAL TREATMENT BUILDING, MUNICH-SCHWABING HOSPITAL, MUNICH, GERMANY.
Richard Schachner, Architect.



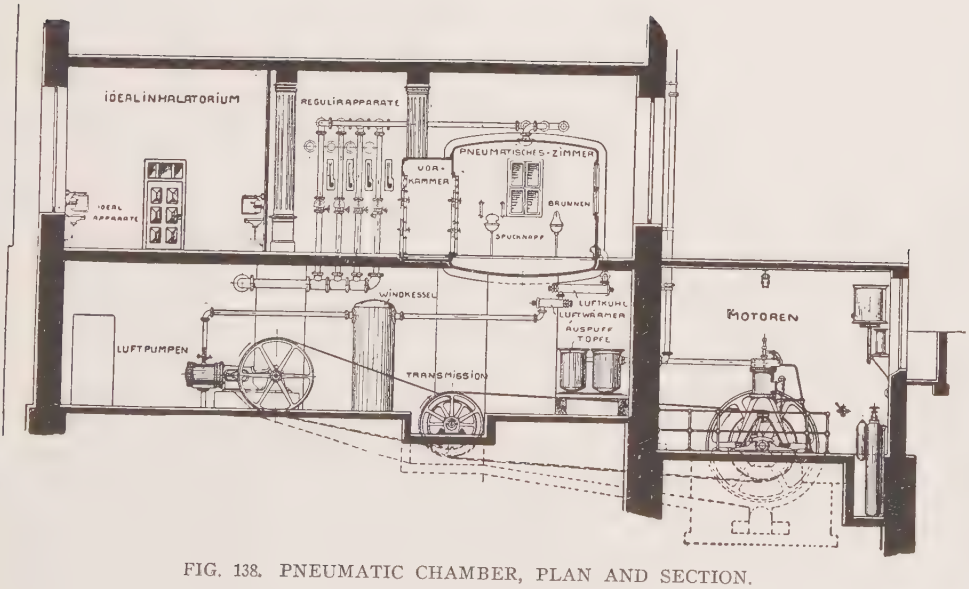


FIG. 138. PNEUMATIC CHAMBER, PLAN AND SECTION.

In Munich-Schwabing, one of Europe's best hospitals, one finds a most complete equipment. If we study this plan in detail (Fig. 137), we find baths of every kind for the relief of suffering humanity. Commencing at the left are the Roentgen-ray department, the inhalation depart-

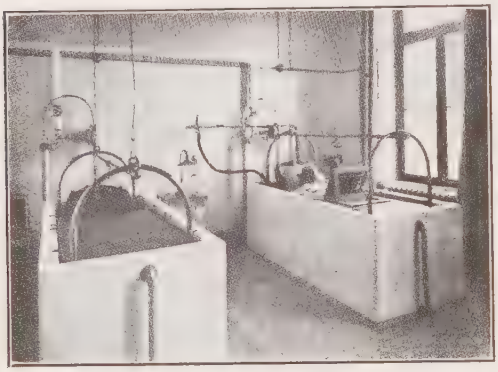


FIG. 139. WATER BED.

ment, the rest rooms, pneumatic chamber, massage and mechano-therapy; and in the center are arranged the various baths—the Fango or Italian volcanic earth bath, the mud or peat bath, sand baths where the sand is heated and applied to the patient, the CO^2 bath, the light bath, and the general hydro-therapeutic room with its spray baths of every description, its warm and cold plunge, and its wading bath.

On the second story of this building is the great sun-bath, so arranged that if the sun is too warm the surface of the glass can be covered by a water curtain, thus reducing the temperature of the room.

In this hospital the writer first saw the pneumatic chamber used for treatment (Fig. 138). A patient needing rarified air and sent to the hospital is placed in one of these rooms, surrounded by his books and papers; pressure in the room is reduced to the prescription amount and he is getting the rarified air of the high mountains at home. Perhaps he may be ordered a greater than atmospheric pressure, in which case the chamber is put under pressure instead of suction.

The water bed, or continuous bath (Fig. 139), is used for the relief of many troubles, notably extensive burns, some skin diseases, and mania, and is considered one of the indispensable pieces of equipment. At the St. Georg the writer saw one poor fellow in the water-bed which he had occupied for months, eating, sleeping and reading, who could not have lived under other conditions. One will see this water-bed, or full-length tub with adjustable hammock, in many wards in Europe. In one hospital that the writer visited each medical ward had its water-bed, and in other wards each bed was provided with pipes from the wall, for cold water circulation in place of ice caps.

The sand bath (Fig. 140), where the patient is packed in sterile sand at the proper temperature, is found in almost every large European hospital.

There are few hospitals in the world, however, which have a more complete mechano-therapy equipment than the Massachusetts General Hospital, Boston, with its splendid Zander room (Fig. 141). But even here the service is largely that of the surgical side.

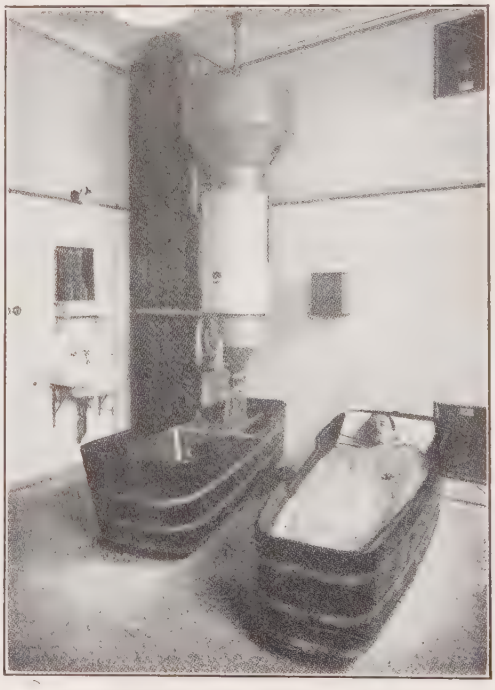


FIG. 140. SAND BATH.

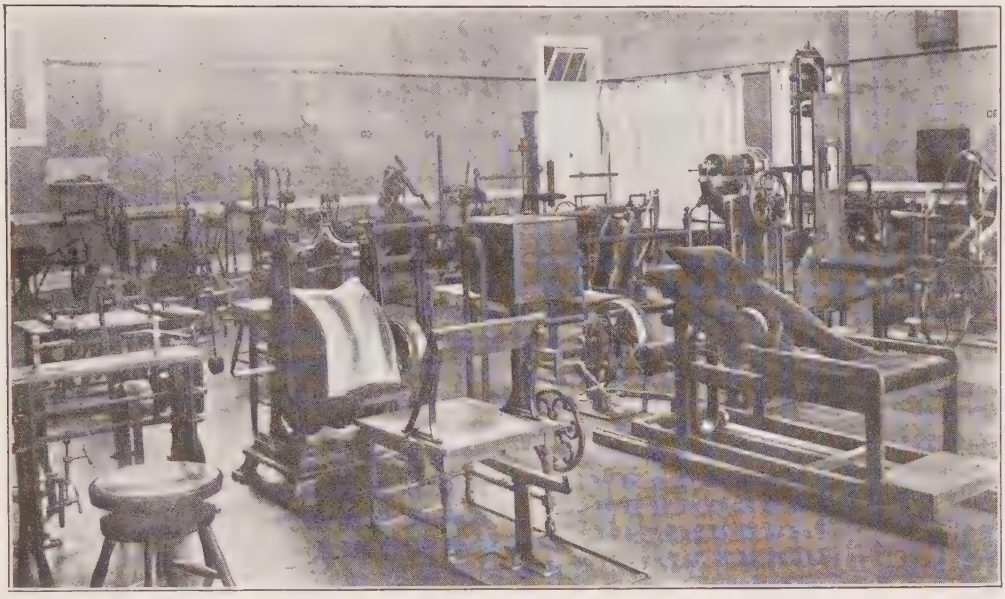


FIG. 141. ZANDER ROOM, MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.

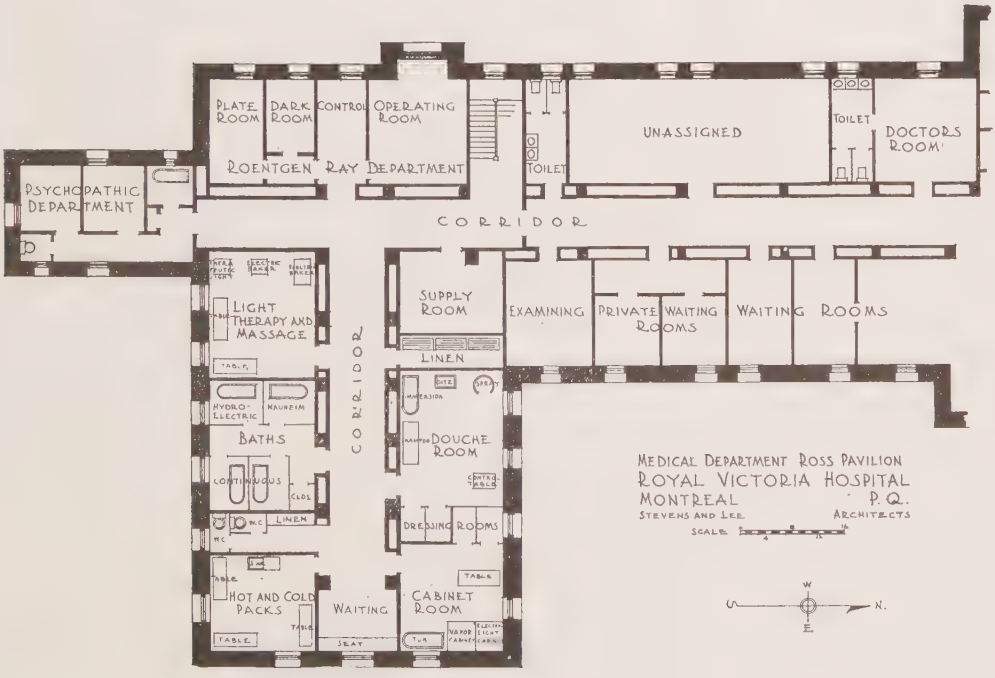


FIG. 142.

In the *St. Luke's Hospital* (Fig. 30), at Jacksonville, about one-half of the second story of the administration building is set apart for medical treatment. This portion is not equipped, but is ready whenever the demand comes and the funds necessary to equip and maintain it are obtained.

In the *Ross Private Pavilion* of the *Royal Victoria Hospital* (Fig. 114) a large section is set apart and equipped for medical treatment, consising of a small psychopathic department, Roentgen-ray department, hydro-therapy, electric Nauheim, and continuous baths, rest, and massage rooms.

The medical treatment department of the *Ottawa Civic Hospital,* Ottawa, Canada (Fig. 79), is not elaborate, but is fairly complete. It has rooms for special tub baths, showers, sprays and douches, packs, massage, etc. There are comfortable rest and dressing rooms.

In the *Cook County,* Chicago, *Psychopathic* building (Fig. 228), there is a good hydro-therapeutic department, with arrangements for continuous baths, packs, etc. Rest rooms are provided. There is also a room for surgical dressings here.

The Southern Pacific and the San Francisco County (Fig. 143) Hospitals, both at San Francisco, not only have very complete medical equipment but are using it constantly with the best results.

Preventive medicine and treatment are much discussed. Why should not the medical treatment or bath-house department, with its many treatment and rest rooms, soon be as important a factor in our hospitals as our operating department is today?

Courtesy "The Modern Hospital"

FIG. 144. BASKET ROOM, PHIPPS PSYCHIATRIC CLINIC, JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

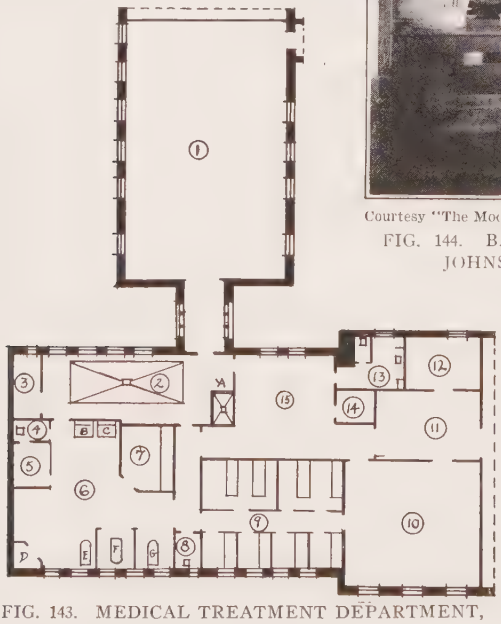


FIG. 143. MEDICAL TREATMENT DEPARTMENT, SAN FRANCISCO HOSPITAL, SAN FRANCISCO, CAL.

1. Mechanical apparatus.
2. Plunge bath.
3. Pump room.
4. Toilet.
5. Irrigation room.
6. Douche room.
7. Steam room.
8. Toilet.
9. Dressing rooms.
10. Lounge room.
11. Hall.
12. Store room.
13. Toilet.
14. Closet.
15. Office.

*The Department of Occupational Therapy.** Departments of occupational therapy are now being established in sanitoria, psychopathic hospitals, and also in general hospitals. Certain facilities are necessary for them to operate successfully.

There will always be some work done by bed-patients and some by up-patients. For the bed-patients, there should be storage space for materials and unfinished work near the wards in which they are; a shelf in the linen closet may be sufficient.

Up-patients usually prefer to go to a special occupation room. This should,

*The author is indebted for this material to Minnie Goodnow, R. N.

when possible, be located near a group of wards, so that it may be easy of access. Very often the patients' sitting room or a sun-parlor may become the occupation room.

With men patients, a part or all of the occupation room should be a shop, one which *looks* like a shop, with a floor that will not be injured by shavings and other debris. If basketry is done, by either men or women, a small tub of water will be needed; the table and floor should therefore be of material not harmed by wetting.

If the occupation room or shop is at a distance from the wards, it should have near it a rest room furnished with a couch and easy chairs. Overdoing is always to be guarded against, and the teacher of occupation will need to have facilities for her patients to rest at proper intervals.

The occupation room or shop must have *good light,* preferably sunshine, and ample artificial lighting for dark days. Plenty of *storage space* for bulky materials is necessary in closets or cupboards with shelves, hooks, drawers or boxes for small articles. There should be a place to lock up small tools. In even a small department one needs a table or bench for woodwork, a large table for basketry and a table for painting. There should be space to store partly finished work, and a cupboard with lock for finished articles. In most institutions a display case will be placed in or near the main office, so that visitors may see the patients' work, or purchase it.

Courtesy "The Modern Hospital"
FIG. 146. OCCUPATIONS CARRIED ON IN THE WARD SOLARIUM, GENERAL HOSPITAL NO. 3, RAHWAY, N. J.

Miss Susan E. Tracy, an authority on occupation, suggests that an occupation room may be a sitting room, veranda, roof garden, sun parlor, or any large room. She specifies as hindrances to satisfactory work basement rooms with poor light, noisy rooms, parlors or rooms with furnishings that are easily damaged, very small rooms or those reached by long corridors.

Most institutions which established this work find it quickly outgows its original quarters. Space is therefore the great need, and rooms large enough for several good-sized work tables.

Courtesy "The Modern Hospital"
FIG. 145. OCCUPATION ROOM, CHICAGO STATE HOSPITAL.

CHAPTER VI.

The Maternity Department

There is a growing call for maternity service in nearly every hospital, whether it be large or small. This has made it necessary to establish an obstetrical department, either by setting apart a section of some building, calling into requisition an existing dwelling near the institution, or erecting a new building or group of buildings for this one service.

Most obstetricians declare that the maternity service should be classed as surgical, since the area of open wound is greater than in almost any other clean surgery, and hence is subject to greater danger of infection from outside. Certainly modern asepsis plays its part in this department, and many a mother owes her health and perhaps her life to the modern methods of care.

Moreover there are many emergencies arising which can neither be foreseen nor prevented, and which can be properly dealt with only by extra help and under hospital conditions.

In order to care for obstetric cases to the best advantage, the hospital or department must be specially planned for the work. Study is necessary toward minimizing the noises of preparing and serving food, provision should be made for privacy or semi-privacy in the ward, and preparation made for emergency conditions.

There are four distinct departments to be considered in planning for obstetrical cases:

1. The waiting department.
2. The delivery or confinement rooms.
3. The puerperal or after-confinement rooms.
4. The creche or nursery.

Waiting Department. With private patients, as a general thing, the patient goes to the hospital but a day or two before, or even on the day of delivery, and occupies at once the room or bed that will be hers during her recovery. In hospitals where charity patients predominate the patients frequently enter from one to three months before confinement. Such women assist about the hospital work and in a measure repay for their care when sick. Where such a practice prevails separate wards or dormitories must be provided. In charity homes for unmarried mothers the situation is the same, and in many the waiting departents are larger than the hospital proper.

The *location* of this department in the hospital group should have most careful study for two reasons:

1st—Because, owing to the crying of the infants, it can well be called the most noisy of all the departments; and

2d—Because, owing to the possible danger of infection from outside sources, it should be as far removed as possible from the other buildings, and should not be used as a passageway to any other buildings.

Delivery Rooms. The delivery rooms, with their sterilizing rooms, labor rooms, doctors' waiting room, etc., should be cut off from the rest of the department by doors. This department should be treated in its details like an operating suite.

The delivery rooms should be large, well lighted, and well ventilated; should, in fact, be operating rooms with all the careful finish and detail, and should be equipped both for day and for night work.

Either a special sterilizing room should be provided, or sterilizers for water, utensils and instruments must be placed in the delivery room.

There should at least be one scrub-up sink in or near each delivery room. In hospitals where mixed cases, colored and white, free and pay, are taken, it is considered wise to provide separate delivery rooms for the different classes.

Patients' Rooms. If open wards are used, it is well to have them small; or, if

the ward is large, subdivided by fixed screens. A certain number of private rooms should be provided, and perhaps a few suites with baths. The finish and detail, toilets, sinks, baths, etc., should be similar to those of the surgical wards of the hospital.

Airing balconies should be provided as in the medical and surgical wards, or rooms should be treated and equipped the same as isolation wards for contagious cases.

Creche or Nursery. The nursery should be light, well-ventilated, cheerful and warm, and well away from the mothers. There should be not only space for a separate bassinet for each baby, but a separate room for bathing and

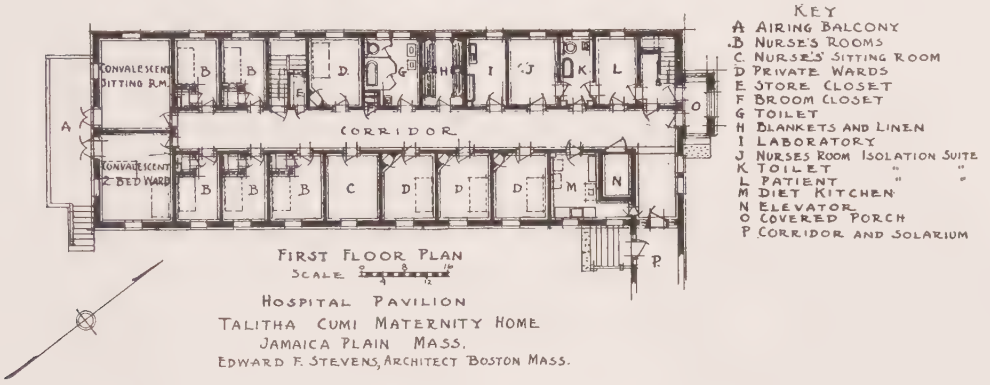


FIG. 147.

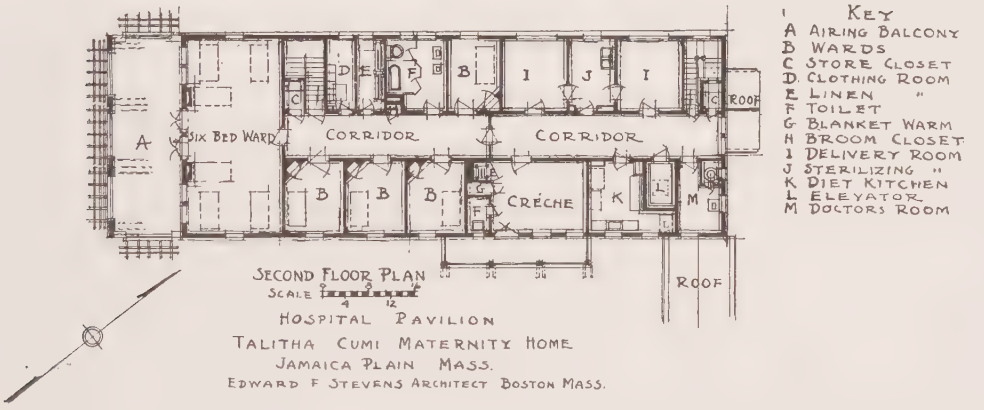


FIG. 148.

solaria can be added if found desirable.

There should be opportunity for the isolating of the occasional cases which may be infected. A simple suite of two rooms and a bath, which will serve as a general utility room, should be arranged on a separate corridor entered from the main corridor, and with an outside entrance as well, if possible. This arrangement will give opportunity for such isolation, but will not prevent the use of these rooms for regular work. The dressing. A balcony should connect with this room, so that the babies may be easily kept out of doors in suitable weather. Linen closet, blanket warmer, linen dryer, etc., should be planned. If the department is large a creche may be provided for ward babies and another for those belonging to private patients.

A few concrete examples will serve to illustrate. In the *Newton Hospital,* Newton, Mass., the maternity service is cared for in a building recently erected

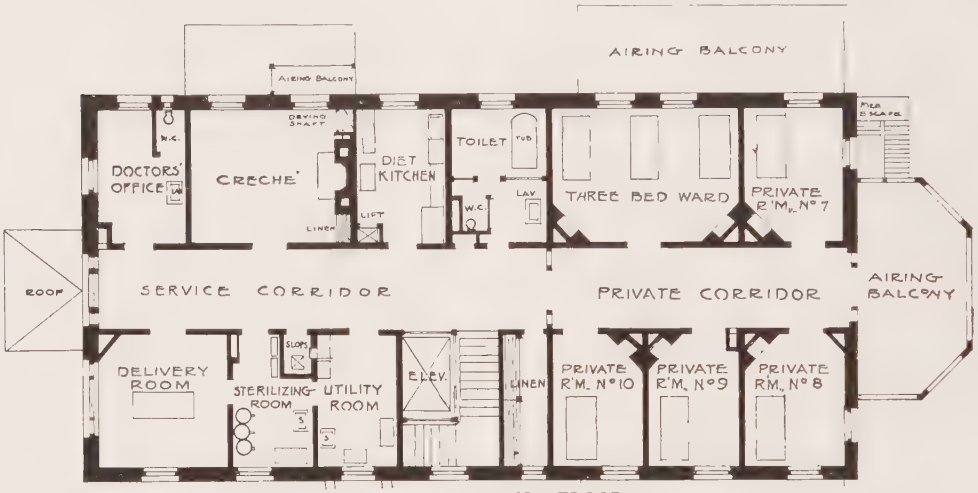
in memory of the founders of the institution. This building is connected with the main group by an underground passage, and on the first floor by an open corridor.

The public ward is on the first floor, together with four private rooms. There are baby rooms, diet kitchen, toilets, linen and medicine closets.

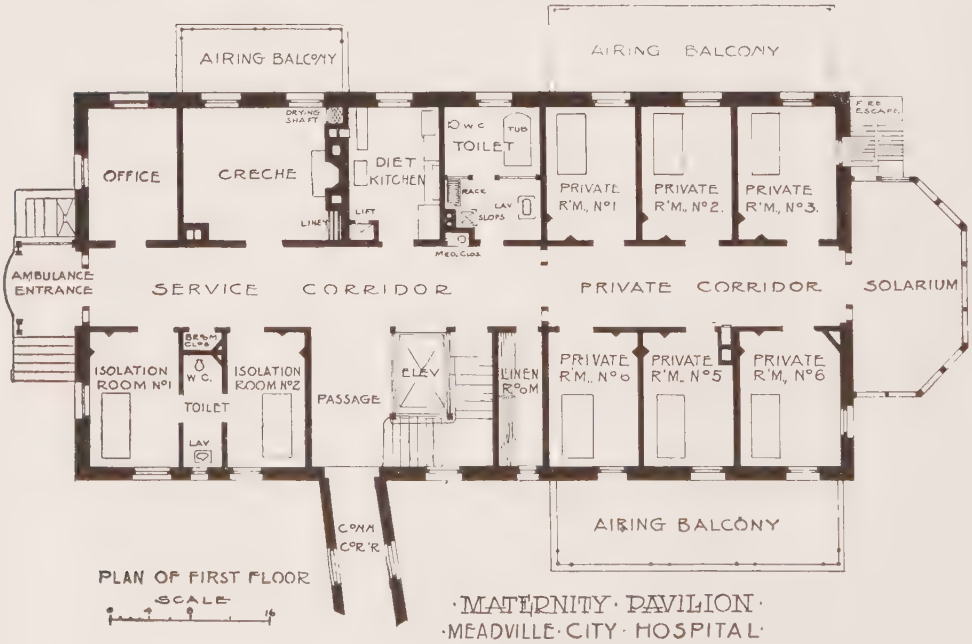
The second floor is devoted to private rooms. The creche is on the south, with its own airing balcony.

On the third floor are the delivery rooms for ward and for private patients, with sterilizing room between. A nurses' duty room, guests' rooms, isolating room toilets and storeroom complete this floor.

The Talitha Cumi Maternity (Fig.



PLAN OF SECOND FLOOR.



PLAN OF FIRST FLOOR
SCALE

·MATERNITY·PAVILION·
·MEADVILLE·CITY·HOSPITAL·
·MEADVILLE, PENN·
·EDWARD·F·STEVENS·ARCHITECT
·BOSTON · MASS·

FIG. 149.

FIG. 150. CRECHE—MATERNITY BUILDING, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.
Edward F. Stevens, Architect.

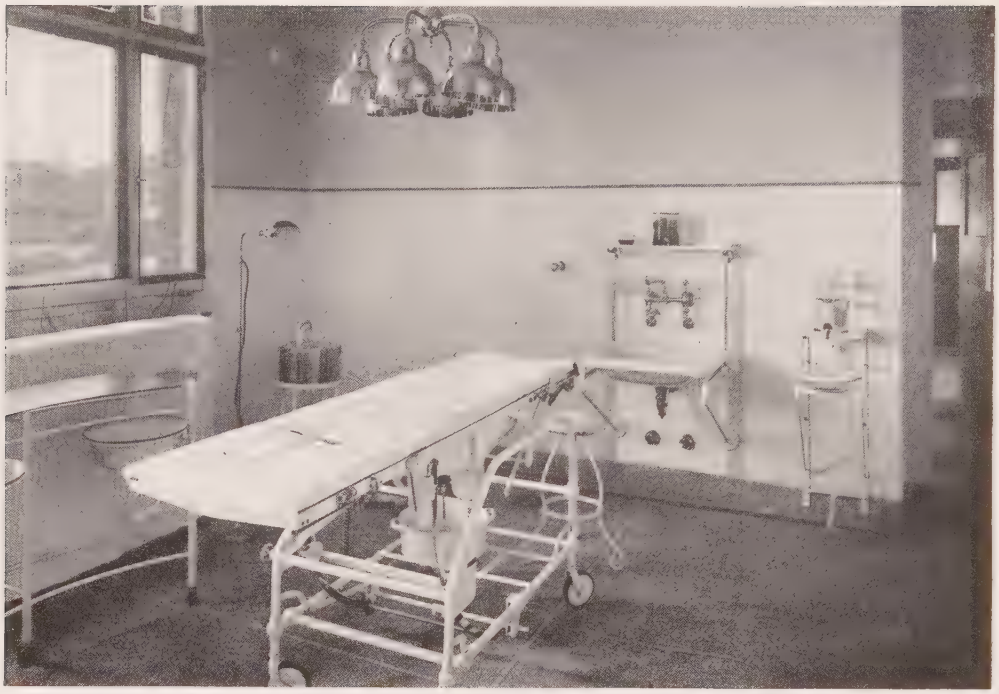


FIG. 151. MATERNITY OPERATING ROOM—BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.
Edward F. Stevens, Architect.

451), Jamaica Plain, Mass., is an institution for young, unmarried mothers. The waiting department is larger than the hospital proper, and is arranged as an industrial home. In this building are the offices of the institution, the kitchen, and dining-rooms. The hospital proper is connected with the waiting department by a closed corridor.

On the first floor of the hospital building (Fig. 147) is a six-bed ward, three private rooms, and an isolating suite so arranged that the doors leading into the corridor can be closed and the suite reached from the service staircase and from out-of-doors. There are toilets, bath, linen room, diet kitchen, and creche on this floor. An airing balcony and a solarium afford outdoor facilities.

The second floor (Fig. 148) is similar, except that the delivery rooms replace the isolating suite. There are two delivery rooms connected by the sterilizing room, and a doctors' room across the hall. The delivery rooms are cut off from the patients' part of the hospital by double doors.

Meadville Hospital, Meadville, Penn., has a separate pavilion for the maternity service (Fig. 149). This pavilion is at the extreme end of a group of buildings. It is two stories in height, with elevator.

There is but one public ward, the remainder of the patients being in private rooms. On the first floor is an isolation suite and a nurses' office. The delivery room, sterilizing room, doctors' room, etc., are on the second floor. Each floor has a creche, which contains an unusual feature, a fireplace. There are the usual airing balconies and a solarium.

In the maternity department of the *Bridgeport Hospital* (Figs. 69 and 70) the ward unit is somewhat different from that of any of the other hospitals mentioned in this chapter. In the main sixteen-bed ward the principle adopted in the Rigs Hospital is introduced—that is, there are four groups of four beds each, and these groups are divided by stationary screens, six feet in height, giving the semi-isolation needed in these rooms.

The creche (Fig. 150), as well as the serving-kitchen and sink-room, is at a

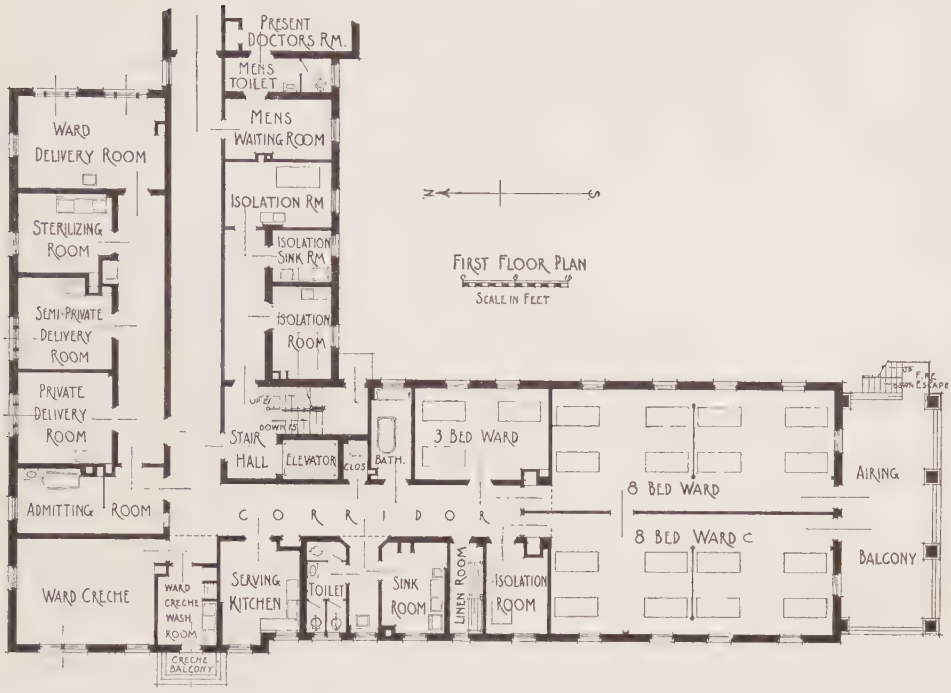


FIG. 152. ST. LUKE'S HOSPITAL, NEW BEDFORD, MASS. MATERNITY DEPARTMENT.
Edward F. Stevens, Architect.

FIG. 153. ST. LUKE'S HOSPITAL, NEW BEDFORD, MASS. MATERNITY DEPARTMENT.
Edward F. Stevens, Architect.

FIG. 154. CHICAGO LYING-IN HOSPITAL, CHICAGO, ILL. THIRD FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects.

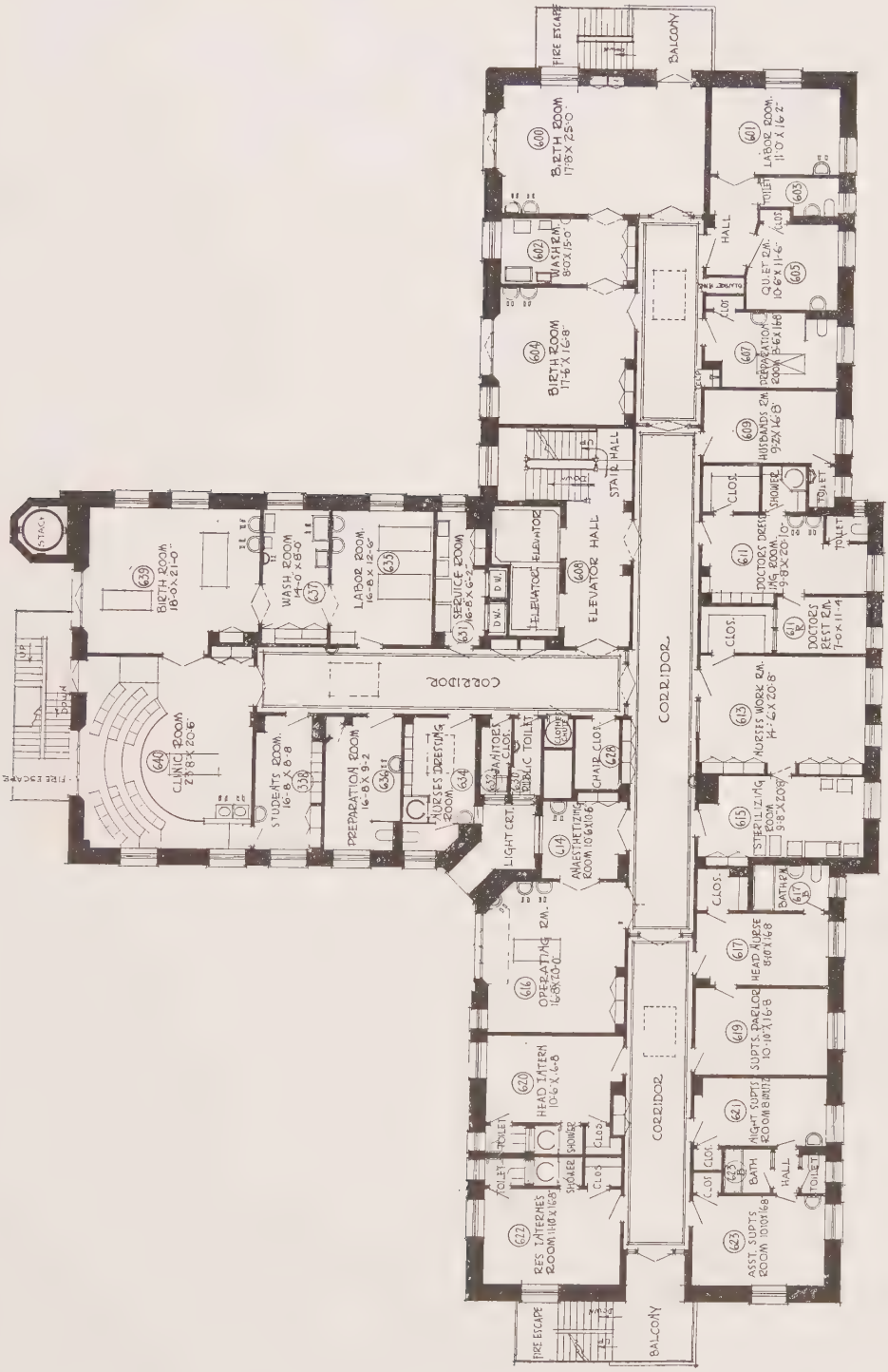

BIRTH ROOM 18-0 X 21-0
WASH ROOM 14-0 X 8-0
LABOR ROOM 16-8 X 12-6
SERVICE ROOM 16-8 X 6-2
ELEVATOR
ELEVATOR HALL
STAIR HALL
CORRIDOR
CLINIC ROOM 27-8 X 20-6
STUDENTS ROOM 16-8 X 6-8
PREPARATION ROOM 16-8 X 9-2
NURSES DRESSING ROOM
LIGHT CART ROOM
PUBLIC TOILET
ANAESTHETIZING ROOM 10-6 X 10-6
OPERATING RM. 16-8 X 20-0
HEAD TATTERN 10-6 X 16-8
RES. TATTERNS ROOM 11-6 X 16-8
SUPTS. PARLOR 10-10 X 16-8
ASST. SUPTS ROOM 10-10 X 16-8
HEAD NURSE 8-0 X 16-8
NURSES WORK RM. 14-6 X 20-8
STERILIZING ROOM 9-8 X 20-8
DOCTORS DRESSING ROOM 9-8 X 20-10
DOCTORS REST RM. 7-0 X 11-4
HUSBANDS RM. 9-2 X 16-8
OPERATION ROOM 15-6 X 16-8
QUIET RM. 10-6 X 11-6
LABOR ROOM 11-0 X 16-2
BIRTH ROOM 17-8 X 25-0
WASH RM. 8-0 X 15-0
BALCONY
FIRE ESCAPE

FIG. 155. CHICAGO LYING-IN HOSPITAL, CHICAGO, ILL. SIXTH FLOOR PLAN.
Richard E. Schmidt, Garden & Martin, Architects.

FIG. 156. WESSON MATERNITY HOSPITAL, SPRINGFIELD, MASS.
FIRST FLOOR PLAN.
Kendall, Taylor & Stevens, Architects.

FIG. 157. WESSON MATERNITY HOSPITAL, SPRINGFIELD, MASS.
SECOND FLOOR PLAN.
Kendall, Taylor & Stevens, Architects.

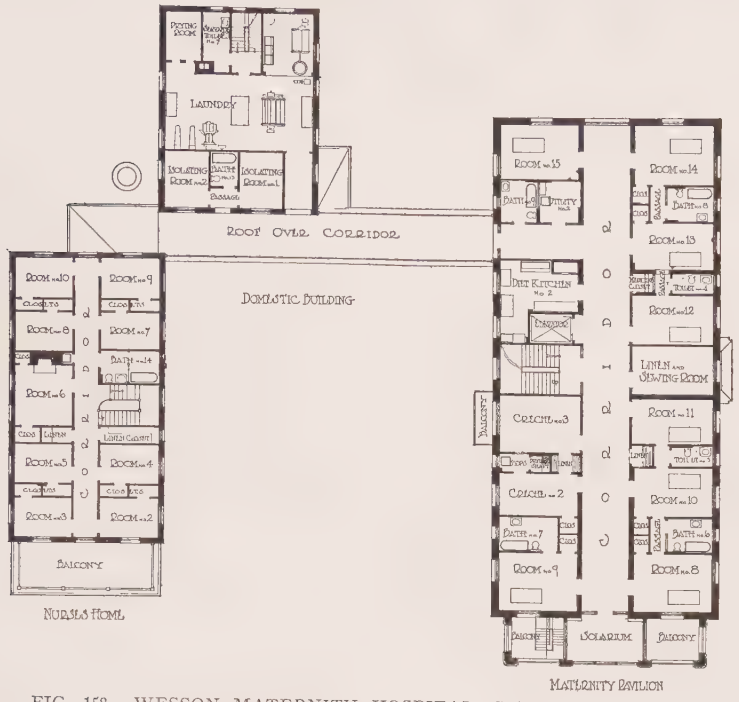


FIG. 158. WESSON MATERNITY HOSPITAL, SPRINGFIELD, MASS.
THIRD FLOOR PLAN.
Kendall, Taylor & Stevens, Architects.

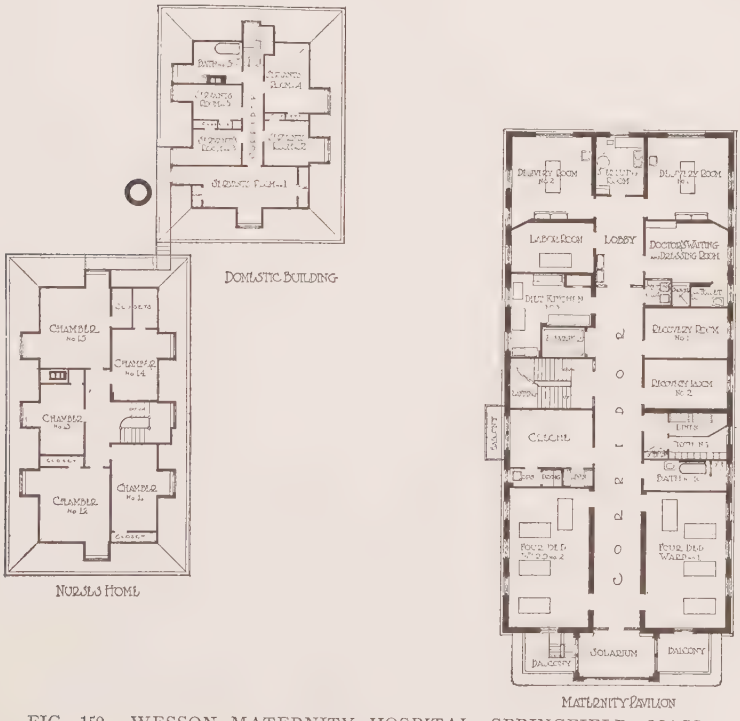
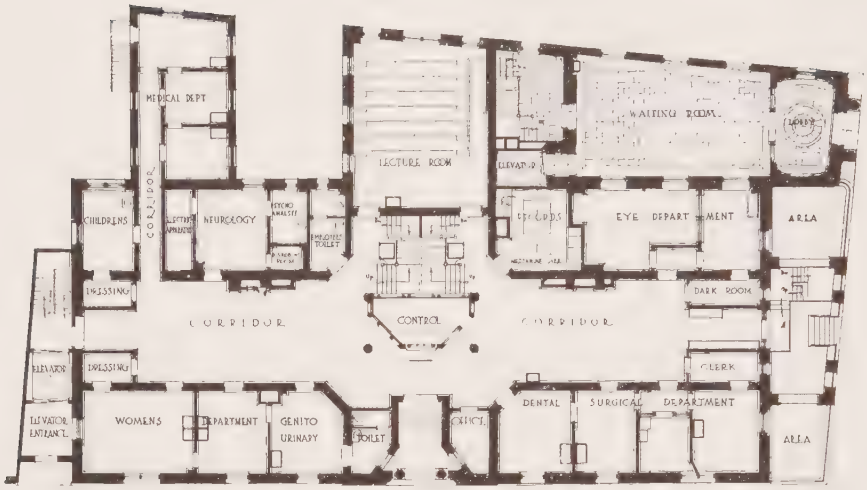
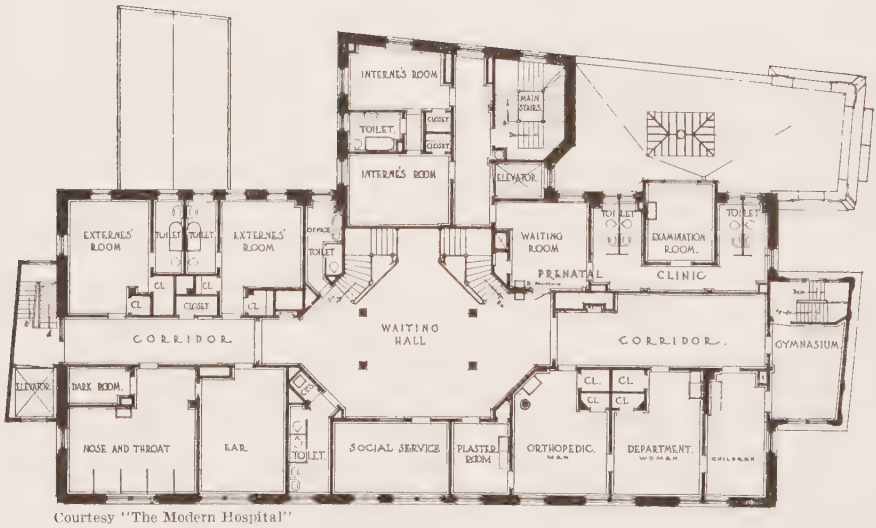


FIG. 159. WESSON MATERNITY HOSPITAL, SPRINGFIELD, MASS.
FOURTH FLOOR PLAN.
Kendall, Taylor & Stevens, Architects.



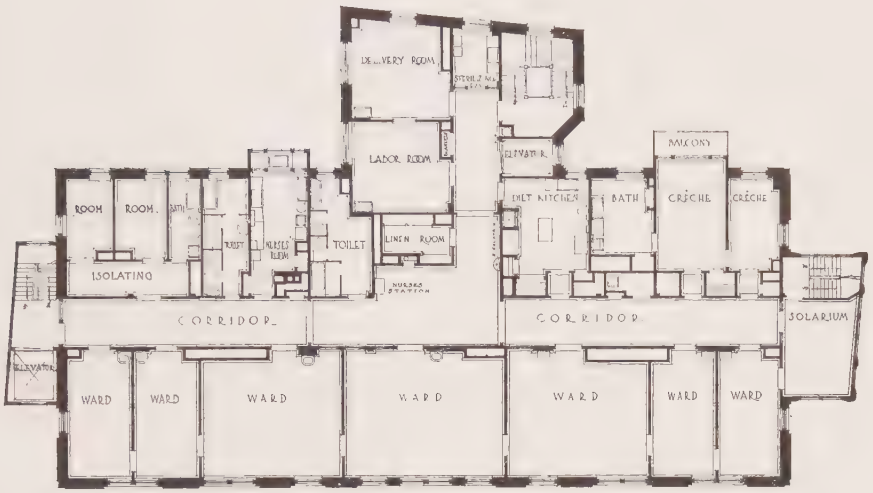
Courtesy "The Modern Hospital"

FIG. 160. JENNIE B. ROBINSON MEMORIAL, MASSACHUSETTS HOMEOPATHIC HOSPITAL, BOSTON, MASS. FIRST FLOOR.
Kendall, Taylor & Company, Architects.



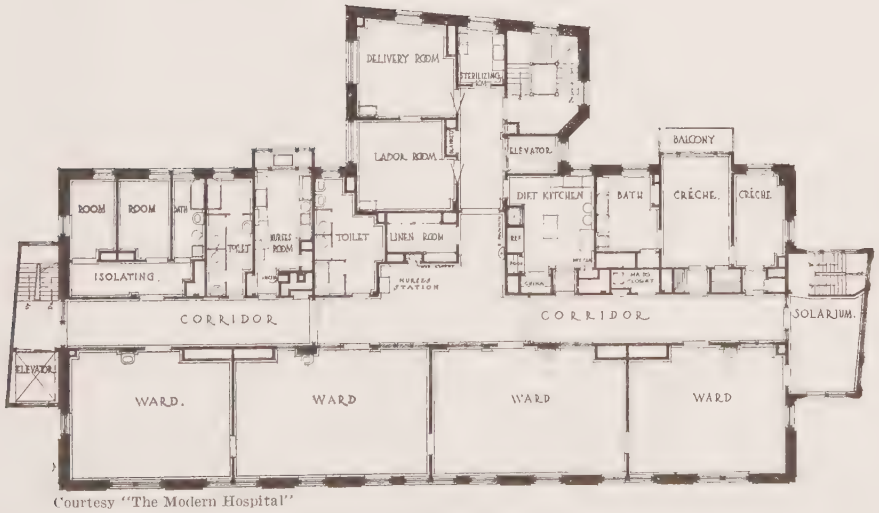
Courtesy "The Modern Hospital"

FIG. 162. JENNIE B. ROBINSON MEMORIAL, MASSACHUSETTS HOMEOPATHIC HOSPITAL, BOSTON, MASS. SECOND FLOOR.
Kendall, Taylor & Company, Architects.



Courtesy "The Modern Hospital"

FIG. 163. JENNIE B. ROBINSON MEMORIAL, MASSACHUSETTS HOMEOPATHIC HOSPITAL, BOSTON, MASS. THIRD FLOOR.
Kendall, Taylor & Company, Architects.

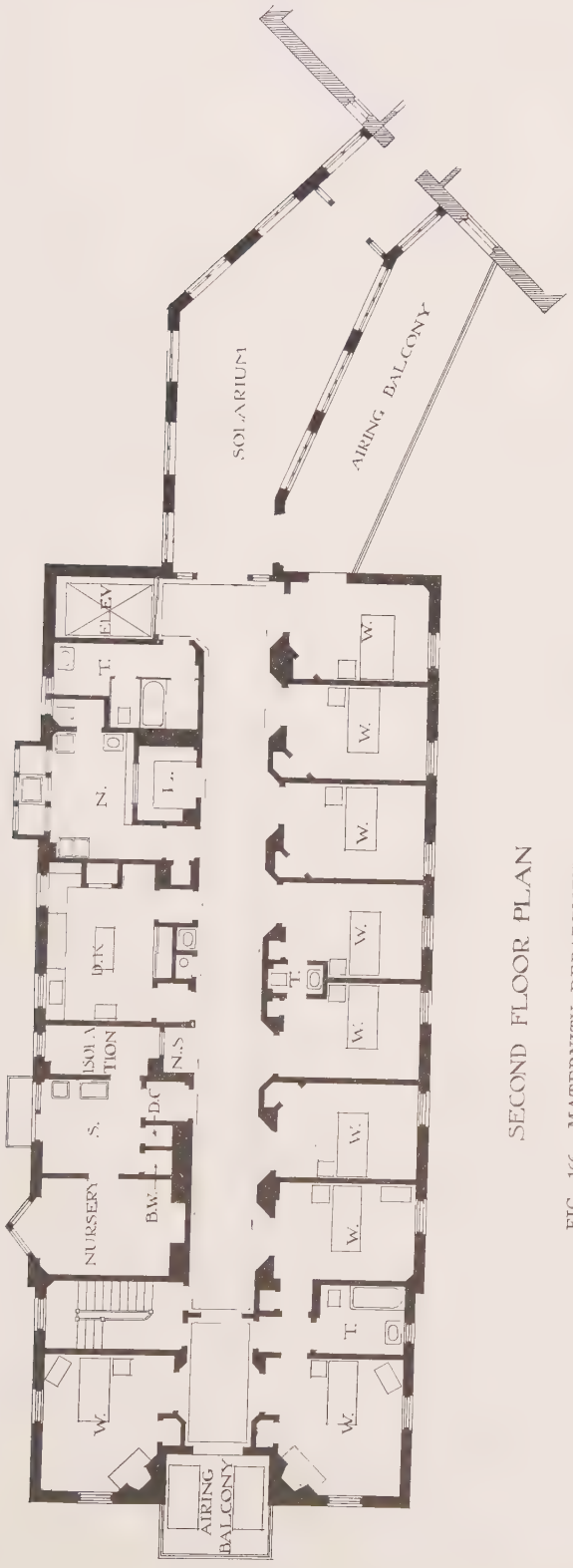


Courtesy "The Modern Hospital"

FIG. 164. JENNIE B. ROBINSON MEMORIAL, MASSACHUSETTS HOMEOPATHIC HOSPITAL, BOSTON, MASS. FOURTH FLOOR.
Kendall, Taylor & Company, Architects.

SCALE
0 5 10 15
SOLARIUM
AIRING BALCONY
E.&F.W.
T.
L.
N.
OPEN WARD
OPEN WARD
W.
W.
W.
W.
D.K.
N.S.
D.C.
B.W.
NURSERY
T.
AIRING BALCONY
S. SERVICE
T. TOILET
D.K. DIET KITCHEN
W. PRIVATE WARDS
N.S. NURSES STATION
B.W. BLANKET WARMER
D.C. DRYING CLOSET
D. DELIVERY
L. LINEN
N. NURSES
FIRST FLOOR PLAN
FAULKNER HOSPITAL
BOSTON MASS
MATERNITY WARD BUILDING
HAVEN & HOYT ARCHITECTS
220 DEVONSHIRE ST BOSTON MASS
SCALE
0 5 10 15 20

FIG. 165



SECOND FLOOR PLAN

FIG. 166. MATERNITY DEPARTMENT, FAULKNER HOSPITAL, JAMAICA PLAIN, MASS.
Haven & Hoyt, Architects.

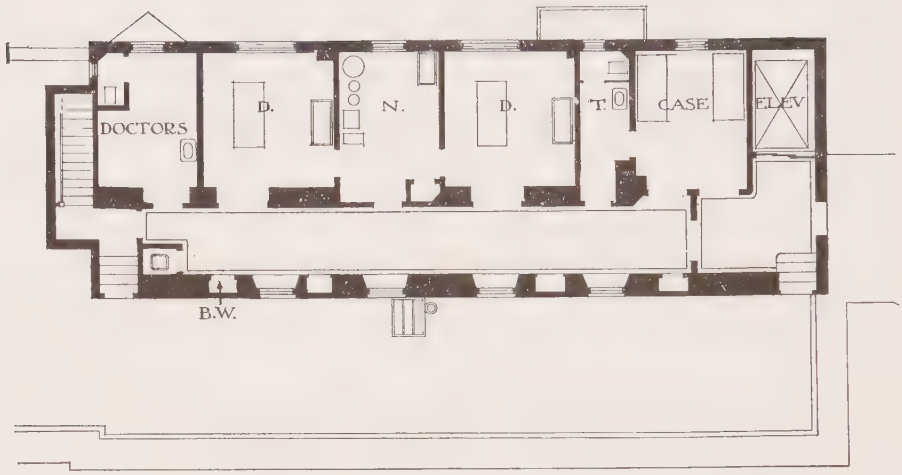


FIG. 167. DELIVERY ROOM FLOOR, MATERNITY DEPARTMENT, FAULKNER HOSPITAL, BOSTON, MASS.
Haven & Hoyt, Architects.

distance from the ward and private-room patients.

In this plan an admitting unit is provided, in which the careful examination and bathing of patients are conducted. Adjoining this admitting unit is the isolation unit, in which any suspicious case can be kept for observation. This isolation department is connected with the serving kitchen of the children's department by a slide. Directly under the slide is the dish sterilizer, the cover of which is controlled from both sides of the partition, so that the infected china can be returned through the dish sterilizer.

The children's ward unit in this building is similar to the maternity ward unit, except that the screens are of clear glass, permitting the nurse on duty to have close observation of all the children and still affording the necessary isolation.

The maternity department of the *Ohio Valley General Hospital* (Fig. 101) is situated at the end of one of the wings, and consists of wards and private rooms, two delivery rooms, a creche, and waiting room. Cases needing isolation are taken to the isolating department in the same building.

At the *St. Luke's Hospital* (Figs. 152 and 153), New Bedford, this service is taken care of in a separate building, with a nearly ideal arrangement of rooms and service.

Placed at the extreme end of the group and adjoining the ambulance entrance of the operating department, the admitting service is simple. The staff sitting room at this point makes a special waiting-room unnecessary. There is, however, a husband's waiting room provided for the anxious fathers-to-be.

The admitting room, with entrance bath, adjoins the delivery corridor. There are three delivery rooms for the three services—public, semi-private and private.

The public wards, two of eight beds each, accommodate the only patients on the first floor, except the occasional isolated case, access for which is from a separate corridor. These ward beds are separated into groups of four by screens, upon which are located the nurses' calls and bedside lights.

The *Chicago Lying-in Hospital* (Figs. 154 and 155), designed in conference with Dr. Joseph De Lee, the well-known obstetrician, is planned on the broad, generous basis of the comfort of the patient, the isolation of sound, and the convenience of management. The nurses' station, located as it is at the crossing of the corridor at the elevator entrance,

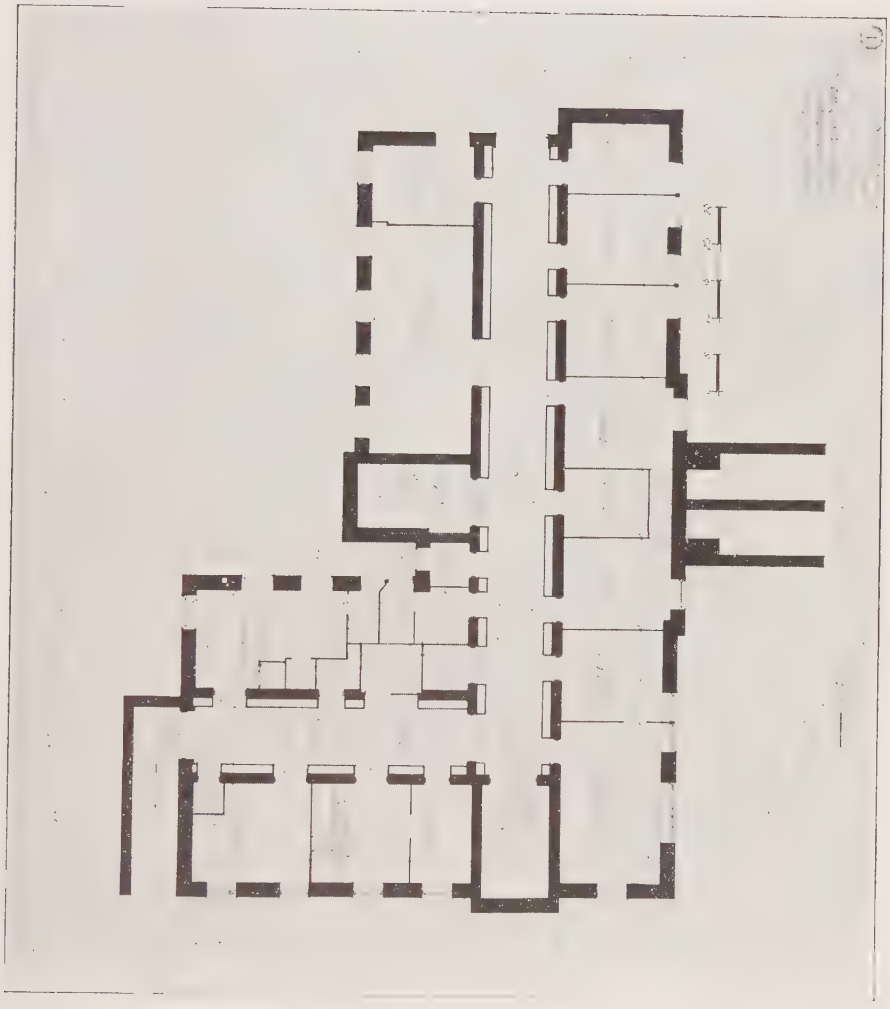


FIG. 168. BASEMENT PLAN, MATERNITY BUILDING—BETHESDA HOSPITAL, CINCINNATI, OHIO.
Gustave W. Drach, Architect.

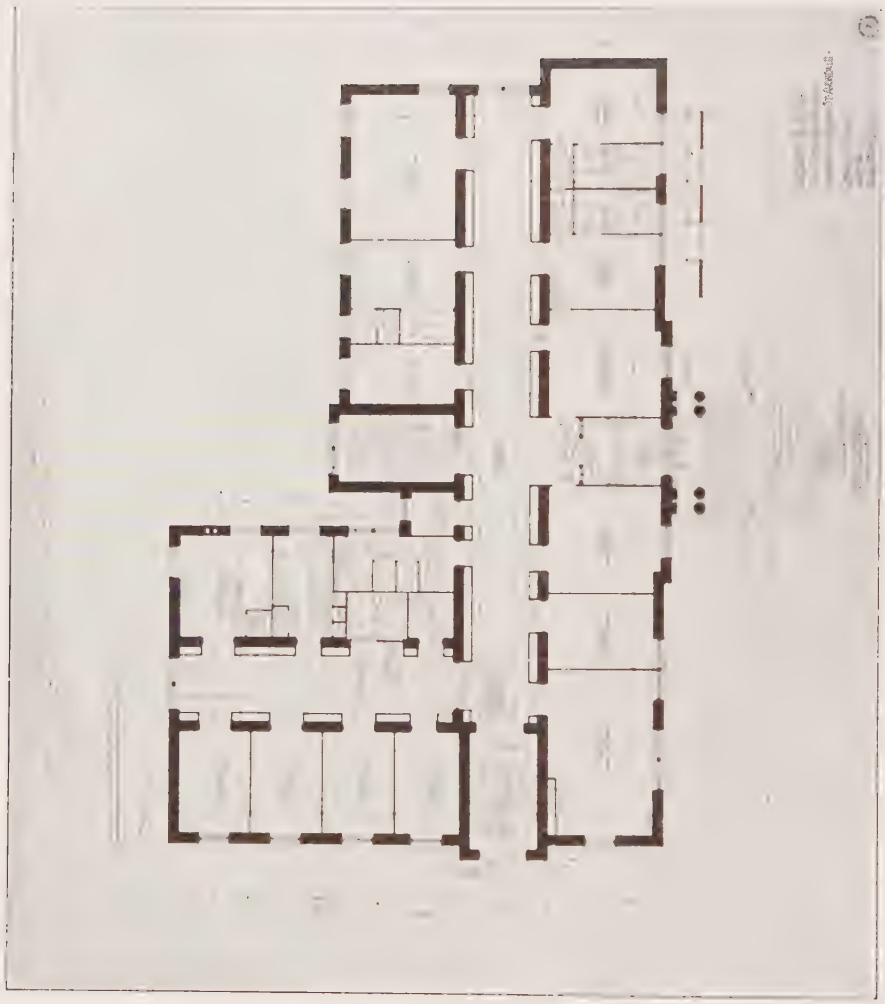


FIG. 169. FIRST FLOOR PLAN, MATERNITY BUILDING—BETHESDA HOSPITAL, CINCINNATI, OHIO.
Gustave W. Drach, Architect.

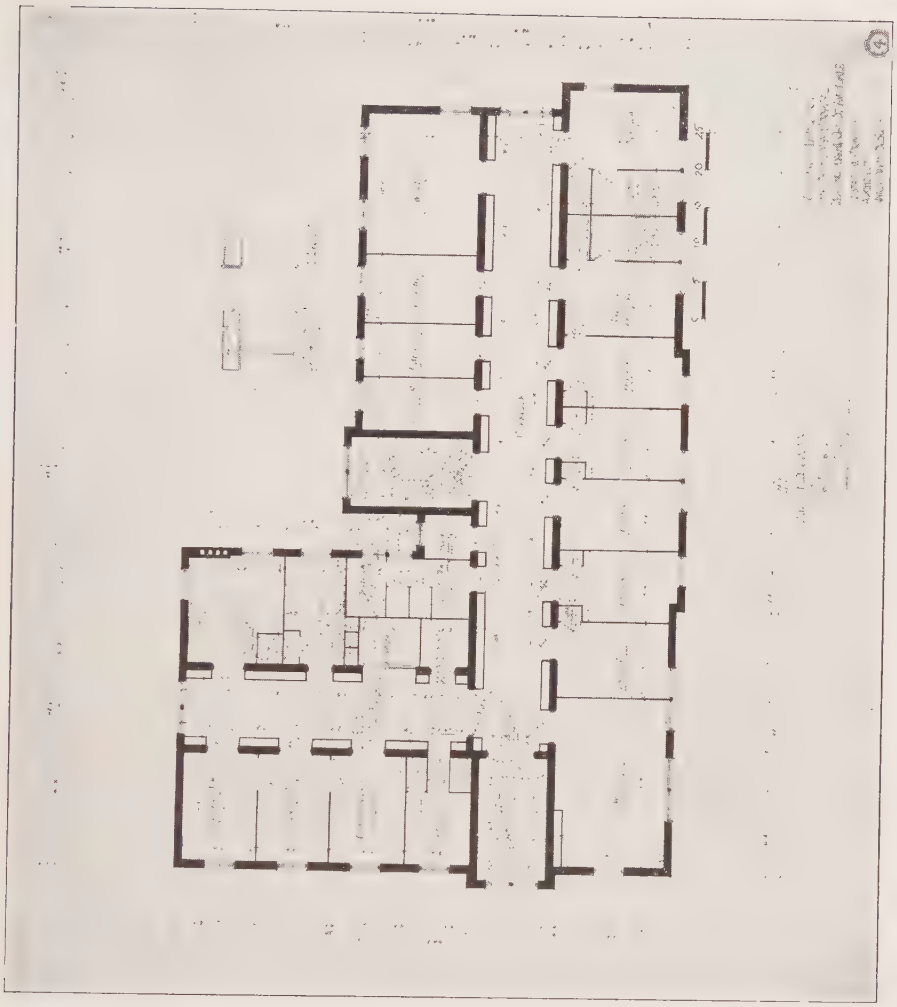


FIG. 170. THIRD FLOOR PLAN, MATERNITY BUILDING—BETHESDA HOSPITAL, CINCINNATI, OHIO.
Gustave W. Drach, Architect.

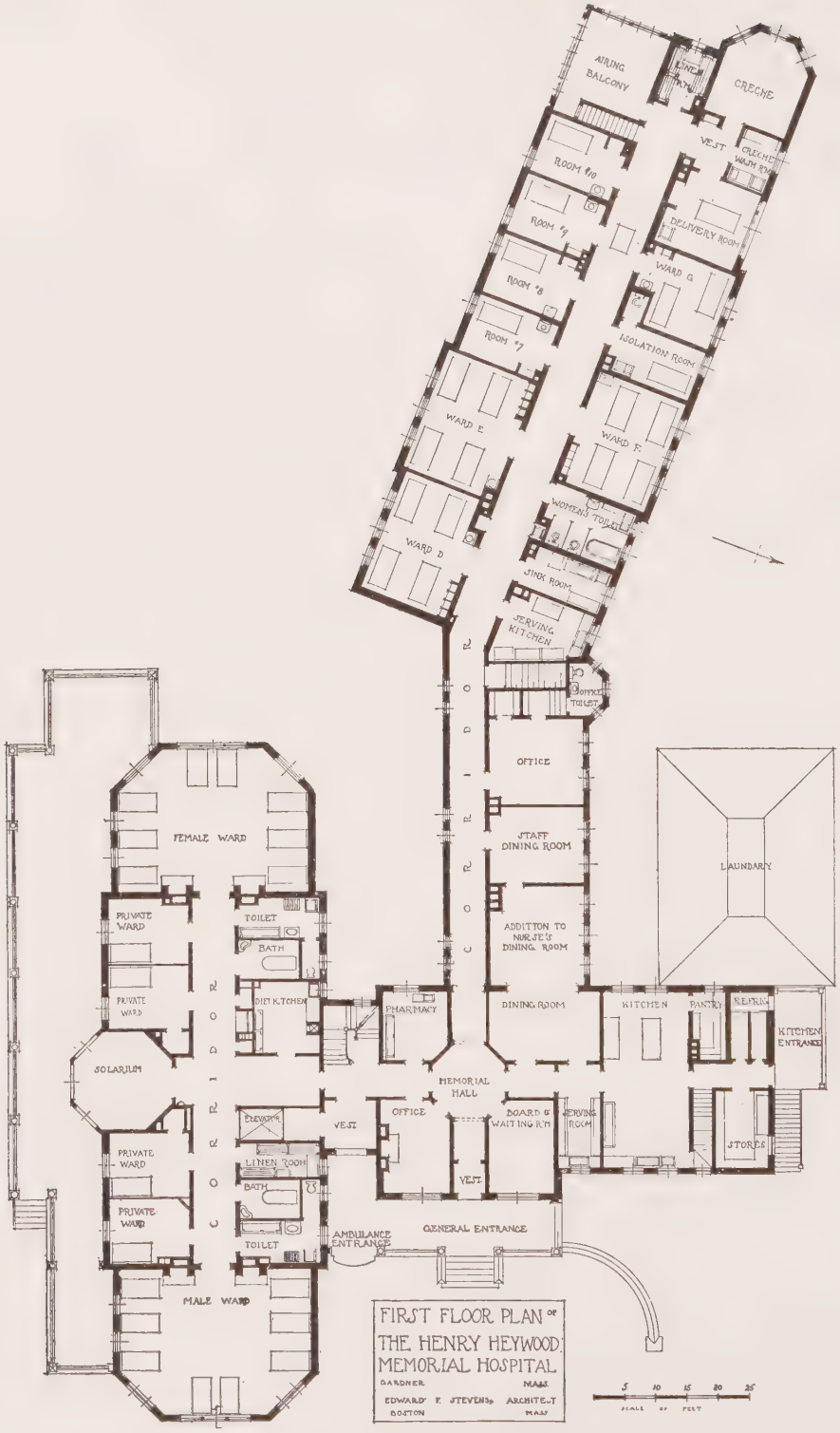


FIG. 171. SHOWING NEW MATERNITY PAVILION.
Edward F. Stevens, Architect.

makes possible the easy surveillance of the entire floor. The nursery and service rooms are placed with regard to care and easy service.

On the sixth floor (Fig. 155) are located the operating section, the birth and labor rooms, so placed as to allow the utmost flexibility of service and at the same time the utmost privacy when privacy is required.

The sterilizing and nurses' room is centrally located. There is a waiting room for the husband and expectant father.

FIG. 172. GROUND FLOOR PLAN (CHILDREN'S DEPARTMENT), HENRY HEYWOOD MEMORIAL HOSPITAL, GARDNER, MASS. Edward F. Stevens, Architect.

The *Wesson Maternity Hospital,* Springfield, Mass. (Figs. 156-159), consists of three fireproof buildings and is a complete hospital unit. The plans of the patients' pavilion, nurses' home, and power plant, show the general relation of one department to the others.

The *Jennie M. Robinson Memorial* of the *Massachusetts Homeopathic Hospital,* Boston (Figs. 160-164) presents the unique combination of an out-patient and a maternity department. The out patient department occupies the ground and first floors, the entrance for the maternity being on another street. The prenatal clinic is on the second floor.

The third floor is for public ward patients, the fourth for semi-private, the fifth for private patients. The largest wards have ten beds. Delivery and labor rooms are provided on the three floors, these being in a wing isolated from the rest of the floor. The nurseries are conveniently placed, yet well shut off. On each floor there is an isolating department for special cases or for twilight sleep. The duplication of service would not be necessary in most hospitals.

The maternity department of the *Ottawa Civic Hospital,* Ottawa, Canada (Fig. 81), has sixteen small wards, twenty-six private rooms, two delivery rooms (for private and for ward patients), a labor room and three nurseries. Ample utilities facilitate service. A good isolation department is provided. The delivery rooms occupy what is in effect a wing by itself.

The maternity department of the *Faulkner Hospital,* Jamaica Plain, Mass., (Figs. 165, 166 and 167) presents an interesting method of saving floor space and therefore cost. The width of the corridors is reduced, and by using a splayed door jamb additional room is secured for the turning of stretchers or beds in the hall. This splayed space is utilized in the rooms for closets.

The delivery rooms are on the third floor, and their floors are sound-proofed. Special features are: the bay window in the nursery, which gives additional sun-

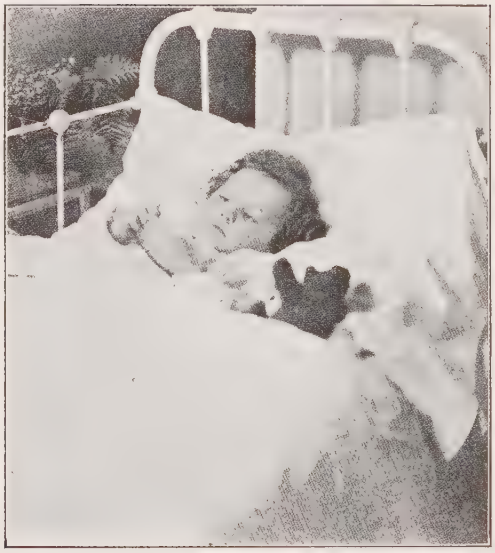
FIG. 172A. WILHELMINA HOSPITAL, VIENNA, AUSTRIA. ROOM FOR PREMATURE BABIES.

light; the blanket warmer and drying closet; the oriel from the nurses' utility room, which gives opportunity for the care of flowers at night in a temperature lower than that of the room; the special rooms at the end of the building, which can easily be isolated if desired.

The maternity building of the *Bethesda Hospital,* Cincinnati, O. (Figs. 168, 169 and 170), has in its basement comfortable rooms for internes, and a good hydro-therapeutic department. On the first floor are the offices and reception room, with wards and private rooms for patients. The utilities are situated in the angle of the building. On the second floor are both wards and rooms for patients; the delivery and operating rooms are shut off from the rest of the floor; there is a sterilizing room and a doctors' room in connection with them.

For smaller units in private hospitals see plans of *Macon Hospital* (Fig. 107), *Melrose Hospital* (Fig. 303), the *Good Samaritan Hospital,* Sandusky, Ohio (Fig. 322), and the addition to the *Heywood Hospital,* Gardner, Mass. (Figs. 171 and 172).

Several authorities urge the provision of a small room which can be superheated, for premature babies. Fig. 172A shows such a room. *Bellevue Hospital,* New York, N. Y., has a similar room, large enough for ten cribs.



"A LITTLE CHILD SHALL LEAD THEM."

CHAPTER VII.

The Children's Department

In planning for a children's hospital or a children's department of a general hospital we have new conditions that do not exist in any of the other departments. We are dealing with suspicious cases, where the only logical treatment is to consider every case as having been exposed to some communicable disease and to provide proper isolation for the study of every new patient. To that end the admitting department should have a sufficient number of subdivisions so that each case may be temporarily isolated until a careful diagnosis can be made. During the usual period of incubation the children should be placed in an observation ward, with the beds so separated by screens, or otherwise, as to prevent the contact of one patient with another. These screens may be made of glass, or glazed cubicles can be provided that will give segregation and the necessary isolation.

Where a children's department is placed in a general hospital, be the department ever so small, it should be separated from that portion of the hospital occupied by adults, which should be assured freedom from the noises coming from the children's ward and safety from the danger of infection.

The necessity of providing private rooms is not so great in the children's hospital as in the adults', for it is found that children are much happier if they can be with others, as their attention is taken from themselves, and they are likely to forget their own discomfort. Even in the general wards, however, outside of the observation ward, a certain segregation or grouping is desirable. A glass screen partition between every three or four beds gives a sufficient amount of separation, but it is not desirable to have wards larger than from sixteen to twenty beds.

As with the adult, every ward unit should be supplied with one or two quiet rooms for the very sick. These rooms can be glazed so that the nurse from the corridor may watch the patient without the necessity of entering the room.

One of the essentials in a children's ward unit is the day room or play room, for in this the little convalescents are freer to romp as much as their infirmities will allow and to gather what comfort they can from the toys furnished them. The floor covering of this room should be some warm material—linoleum or cork carpet, for instance, or even cork tile.

The serving kitchen and sink room should be very little different from those provided for the adult ward units. The toilet and bath facilities, however, should be entirely different. The waterclosets should be low and easily accessible, as also should the wash basins. For bathing, the shallow tub or slab tub affords the most convenient method of washing children. Without undue effort on the part of the attending nurse the children can be washed in clean running water through a spray attached to a rubber hose. The temperature of the water can be controlled either by a control device or by a large storage tank placed directly above the bathing slab. By using this method the patient is never washed in dirty or poisoned water, as is the case in bathing in a filled tub. (See Chapter XVI, "Plumbing.") In this bathing room should be placed a cabinet for the toilet articles of each individual child. This should be divided into compartments and should contain the usual mug, tooth brush, comb, and hair brush.

A simple device to hold the toilet articles of the children, devised by Mr. Bartine, superintendent of the Ruptured and Crippled Children's Hospital in New York, may be hung on the end of each bed. This contains not only the toilet

articles, but the towel also. Of course, this necessitates the taking of these articles to the toilet room when they are to be used.

The prevalence of *contagious* diseases in a children's hospital is so much greater than in the hospital of the adult that it is desirable to have a section of the hospital planned and set apart for the care of such diseases. This department should be treated the same as the contagious hospital—that is, there should be a certain number of cubicles or rooms where each individual bed is screened, and the same care maintained in the treatment of cases as in the contagious hospital.

Here the *orthopedic service* is, as a general thing, greater than in the hospital for adults, and it is decided economy, if the hospital is large, to have a department for the manufacture of corrective apparatus; this is well illustrated in the Hospital for Sick Children in Toronto and in the Ruptured and Crippled Children's Hospital in New York.

The requirements for operating rooms and surgical dressing rooms do not differ from those described in the chapter on the ward unit.

Dr. McLean, of the *Babies' Hospital*, New York, regards the following as essential in a children's hospital or department: (1) Balconies or roof space for two-thirds of the patients. (2) Isolation rooms for communicable diseases, respiratory cases and meningitis cases. (3) For babies, he urges a warm room with cubicles and humidity control.

He advocates the cubicle system for all wards, not only as a means of limiting infections, but on account of drafts, which he considers a menace to babies.

The question of color and decoration is one which requires careful study. The children can sometimes be quieted more easily by pictures on the walls than in any other way. Simple illustrations from Mother Goose, stenciled at a convenient height for the children to look at, is one way of providing for this. One of the most attractive wards which the writer has ever seen was in the children's department of the *St. Thomas Hospital* in London (Fig. 173). Here the walls were lined the entire height with tiles depicting interesting incidents in child life. The admitting room of the *Forsyth Dental Clinic* (Figs. 174 and 175) in Boston is another good example of ceramic decoration.

FIG. 173. CHILDREN'S WARD, ST. THOMAS' HOSPITAL, LONDON, ENGLAND.

A few examples of children's hospitals and departments will serve to illustrate some of the points which are mentioned.

In the children's clinic of the *Dusseldorf Hospital*, at the entrance is a small

FIG. 174. FORSYTH DENTAL INFIRMARY, BOSTON, MASS. CERAMIC FRIEZE IN WAITING ROOM.

hospital isolation department of four beds, for the observation of doubtful cases. The ground floor is for the accommodation of infants and has an interesting incubator department consisting of six cells or tiny rooms, each for two cots. The lower portion of these is constructed of marble and the upper of two layers of glass, with elaborate apparatus for controlling the temperature, humidity and ventilation of each cell from the corridor. The utensils are contained in

FIG. 175. FORSYTH DENTAL INFIRMARY, BOSTON, MASS. CERAMIC FRIEZE IN WAITING ROOM.

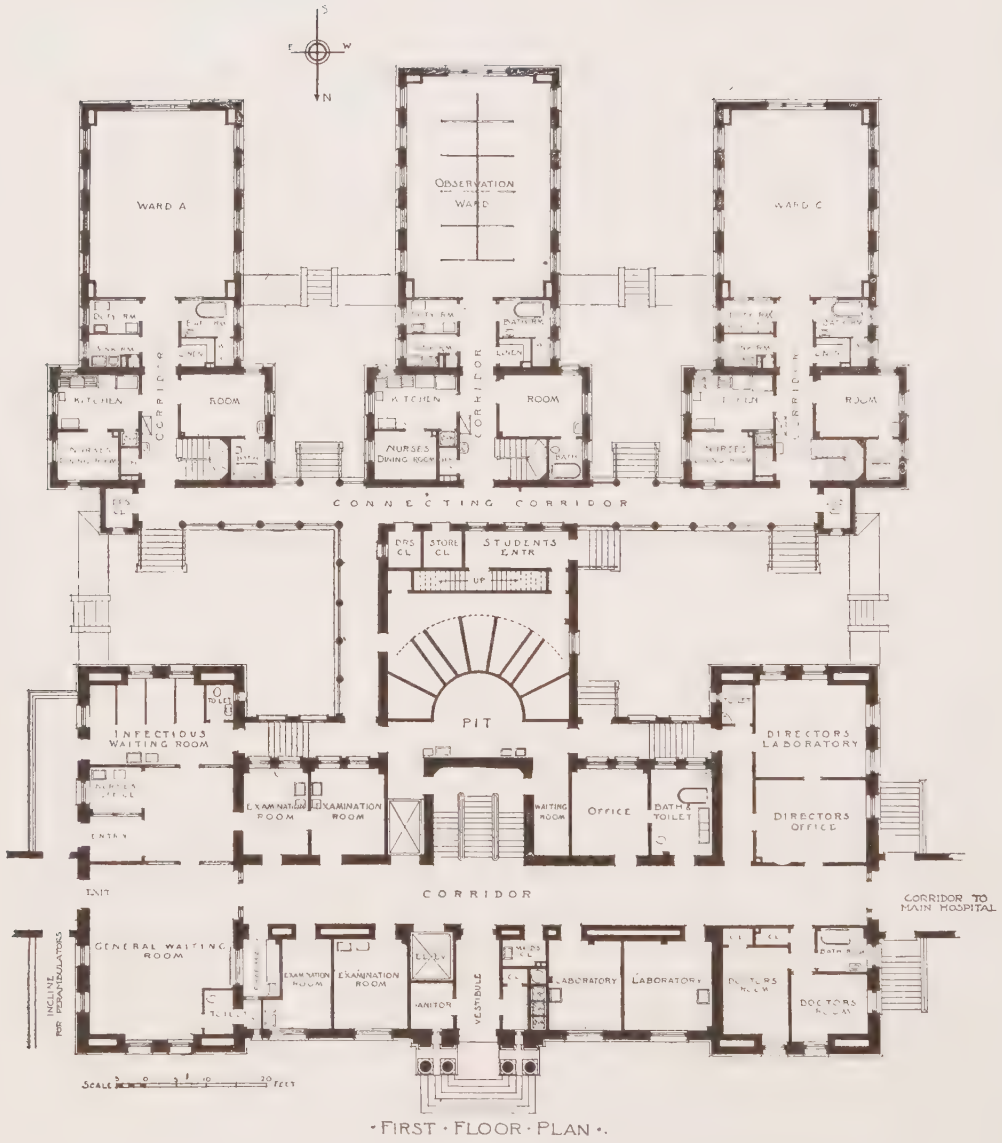


FIG. 176. HARRIET LANE HOME FOR INVALID CHILDREN, JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

Wyatt & Nolting, Butler & Rodman, Associated Architects.

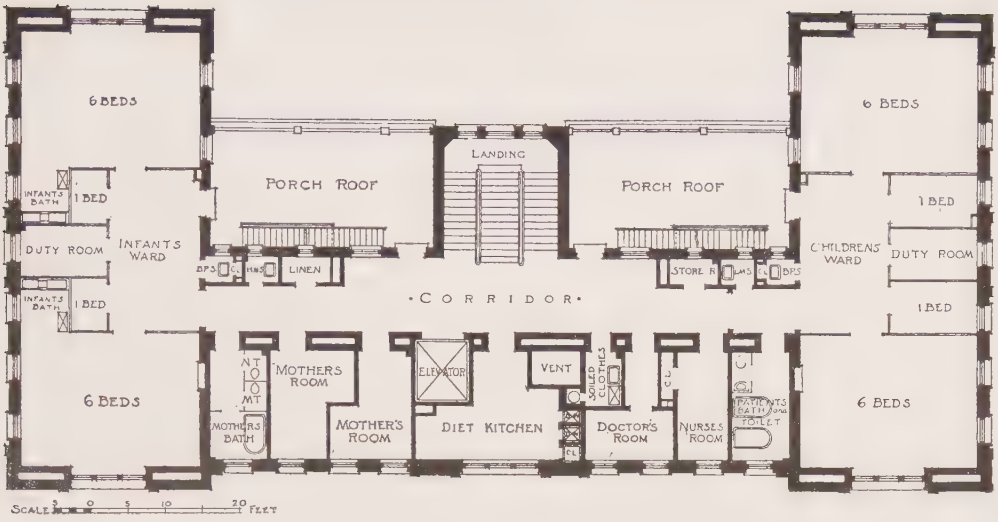


FIG. 177. HARRIET LANE HOME FOR INVALID CHILDREN, JOHNS HOPKINS HOSPITAL BALTIMORE, MD.

Wyatt & Nolting, Butler & Rodman, Associated Architects.

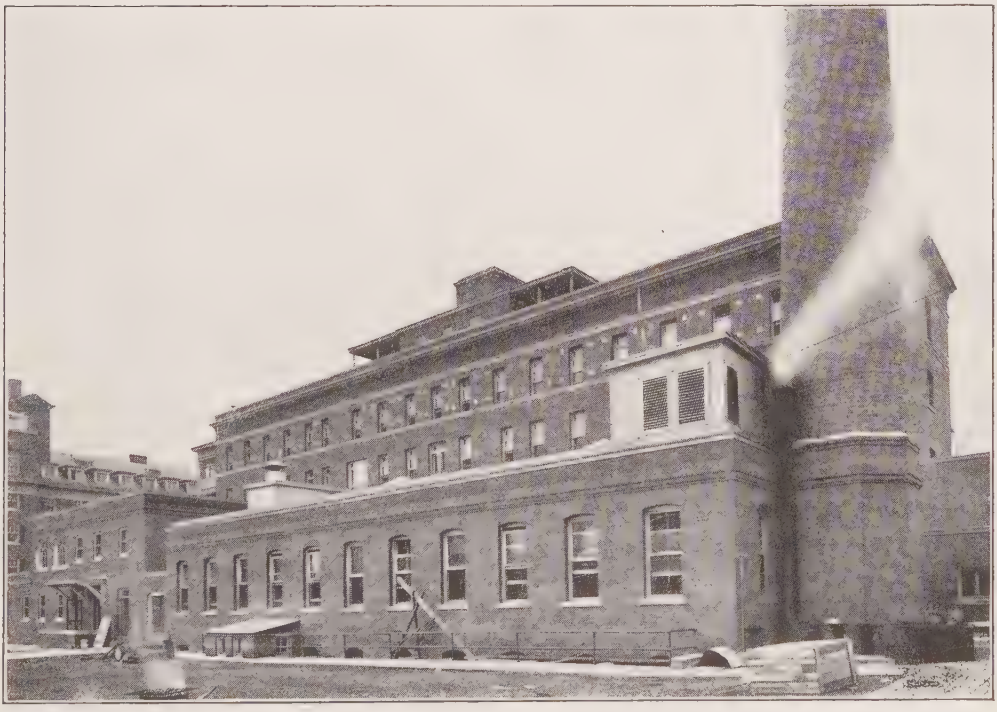


FIG. 178. HOSPITAL FOR SICK CHILDREN, TORONTO, CANADA, ISOLATION PAVILION.

Stevens & Lee, Architects.

glazed compartments at the head of each bed. The first floor of the clinic contains the wards for the older children.

The Harriet Lane Home for Invalid Children (Fig. 176 and Fig. 177) (the children's department of the Johns Hopkins Hospital), planned by Mr. Charles Butler, of New York (in collaboration with Wyatt & Nolting of Baltimore), to whom the writer is indebted for the data, is worked out most carefully to provide for the proper observation and segregation. This plan consists of the main building, with three small ward units. The patient enters through the main admitting room, with the examining rooms adjoining. Suspicious cases are admitted through what is termed the infectious waiting-room, and one of the three wards provided is for observation purposes. In this, each bed is screened from its neighbor by a close glass and metal screen. Each of these ward units contains a duty room, sink room, bath room, isolation room, and a serving kitchen with nurses' dining-room adjoining.

Perhaps no children's hospital in this part of the world is doing greater work than *The Hospital for Sick Children,* at Toronto, which administers more to poor children than to the children of the rich, both in the outdoor and in the indoor departments, as well as in the summer Lakeside Home.

The isolation building (Figs. 178 and 179) of this group is planned particularly for the care of an epidemic and for small children. It is designed on the principle of the Pasteur Hospital in Paris, and will be described in detail in the chapter on contagious hospitals. It provides for absolute isolation of suspected cases, or contagious cases as they develop. A separate entrance, separate elevator, and a separate corps of nurses are provided for this section of the hospital.

This hospital carries on a very large out-patient clinic. (See plan Out Patient Department, Fig. 278). The original hospital has been remodeled, airing balconies and day rooms added, and the wards opened up and brought into the sunlight.

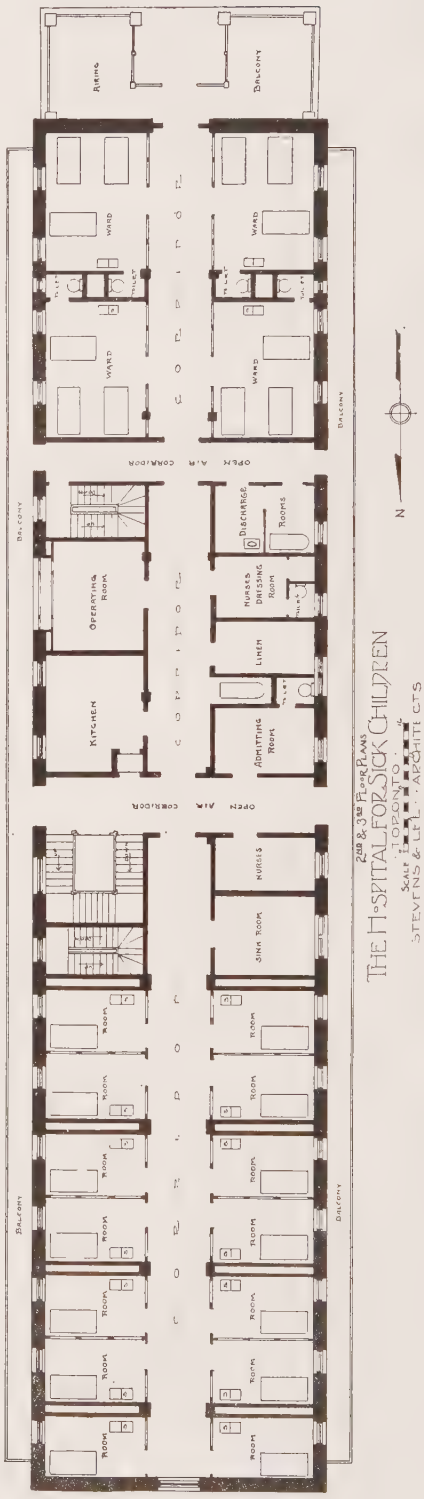


FIG. 179. ISOLATION PAVILION.

FIG. 180. HOSPITAL FOR SICK CHILDREN, TORONTO, CANADA. PASTEURIZING ROOM.

FIG. 181. MELROSE HOSPITAL, MELROSE, MASS. CHILDREN'S WARD.

FIG. 182. CHILDREN'S WARD, MATERNITY BUILDING, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.
Edward F. Stevens, Architect.

One department of this hospital which probably no other hospital of its size has is the complete plant for the pasteurization and modification of all milk, not only for the hospital, but for a very large outpatient distribution. This department has the most modern, up-to-date equipment. (Fig. 180.)

Two or three examples of children's departments in general hospitals will illustrate some of the points suggested in the preceding paragraphs.

In a small hospital in Melrose, Mass. (Fig. 304), the children's department, although very small, is separated from the main corridor by two glazed doors. The ward (Fig. 181) is connected with a large outside airing balcony, and is provided with special children's toilet, and a small isolation room with glazed walls for better observation is provided.

In the children's department of the *Bridgeport Hospital* (Fig. 182), Bridgeport, Conn., eighteen children are cared for in the main ward. This ward is subdivided by glazed screens into groups of four or five beds each, the glazed screens permitting perfect supervision. A small isolation room is provided for one or two more patients. A large, well-lighted day room (Fig. 183), ample airing balcony, and complete service rooms, including serving kitchen, sink room, surgical dressing room, bathing room and toilets, are provided.

The simple decoration on the walls of the main children's ward, depicting mountain scenery, and a large memorial window add to the color effect of this department.

Adjoining the children's department is a small infectious department, consisting of two isolation rooms and an isolation toilet. This isolation department, while adjoining the children's department, can be entirely shut off and served from a cross corridor connecting with the admitting department. (See Fig. 69.)

Another good example of a children's ward building is shown in the plans of

FIG 183 DAY ROOM IN CHILDREN'S WARD, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN
Lockard E. Stevens, Architect

FIG. 184. WORCESTER CITY HOSPITAL, WORCESTER, MASS. CHILDREN'S BUILDING.
Fuller & Delano, Architects.

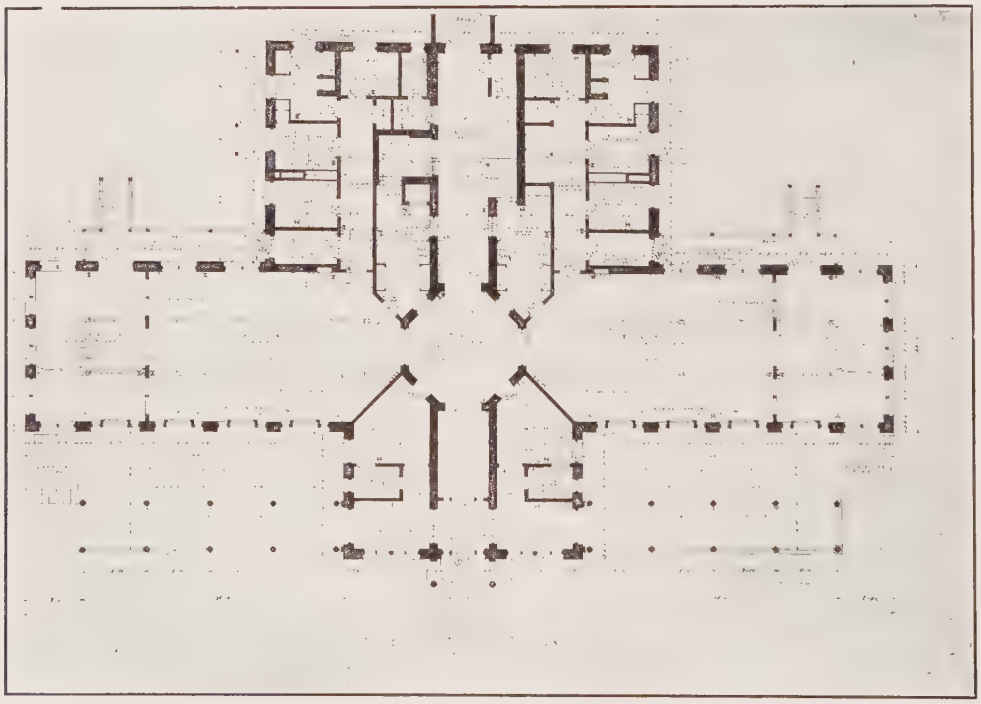


FIG. 185. WORCESTER CITY HOSPITAL, WORCESTER, MASS. CHILDREN'S BUILDING.
Fuller & Delano, Architects.

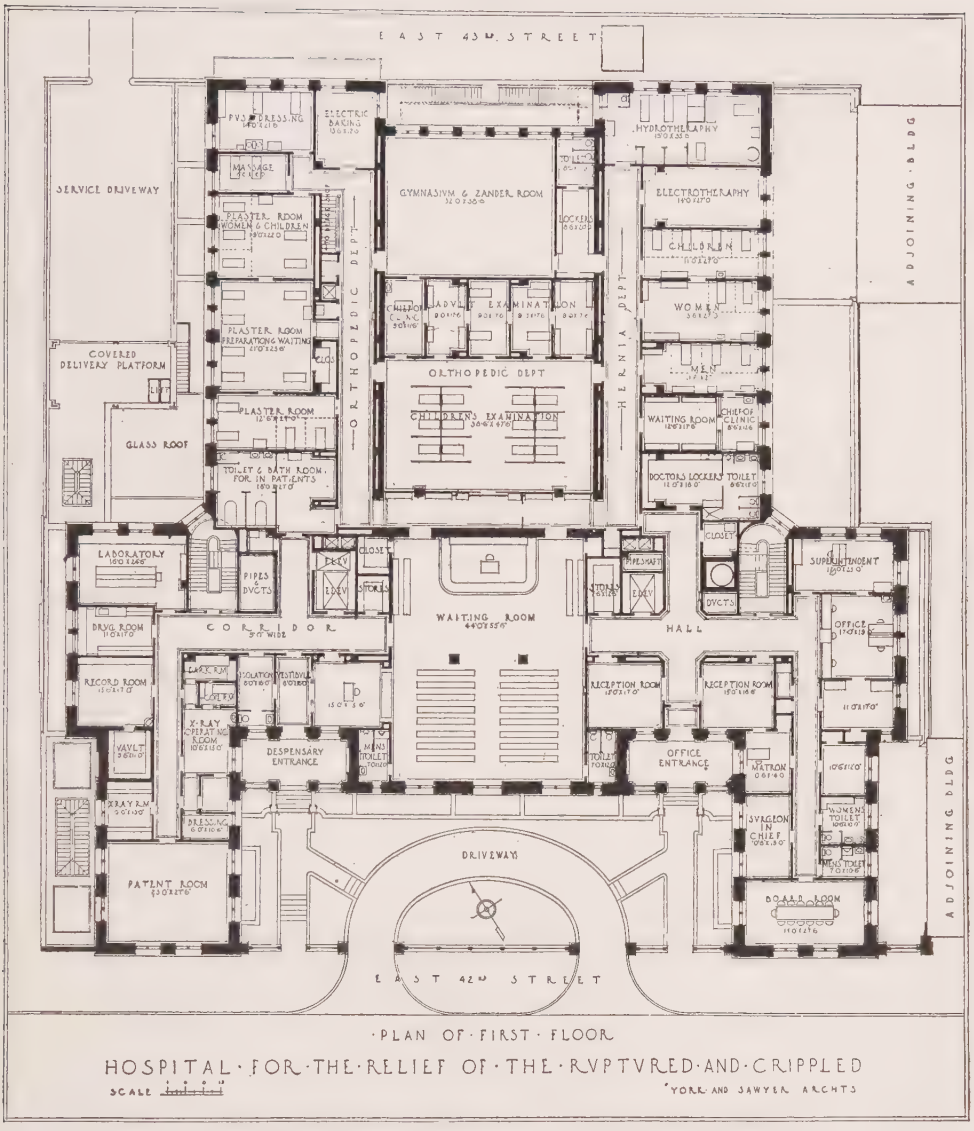


FIG. 186.

the children's pavilion of the *Worcester City Hospital* (Figs. 184 and 185). The wards, the private rooms, and the utilities are grouped around a central rotunda in such a way that surveillance is easily kept of every portion of the floor. Here the natural system of ventilation is used—i. e., ventilating the entire wards from the center of the ceiling, which slopes at an angle of at least thirty degrees. This construction is well hidden in the exterior treatment.

In the plans for the *Hospital for Ruptured and Crippled* (Figs. 186-188), New York City, a most comprehensive scheme is carried out. This service is largely for children and the planning is simple and straightforward. The outpatient section, consisting of thoroughly equipped rooms and departments, is entered on the left

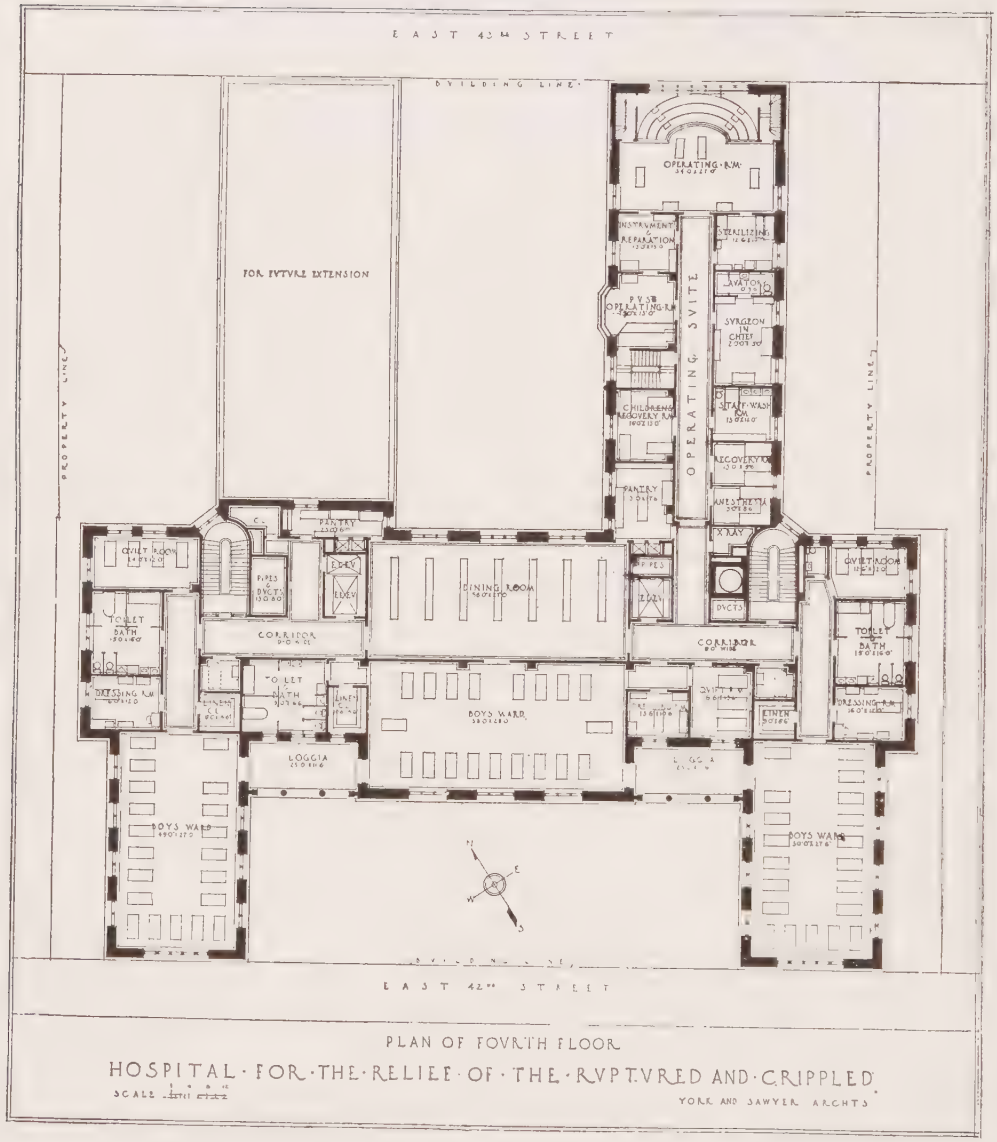
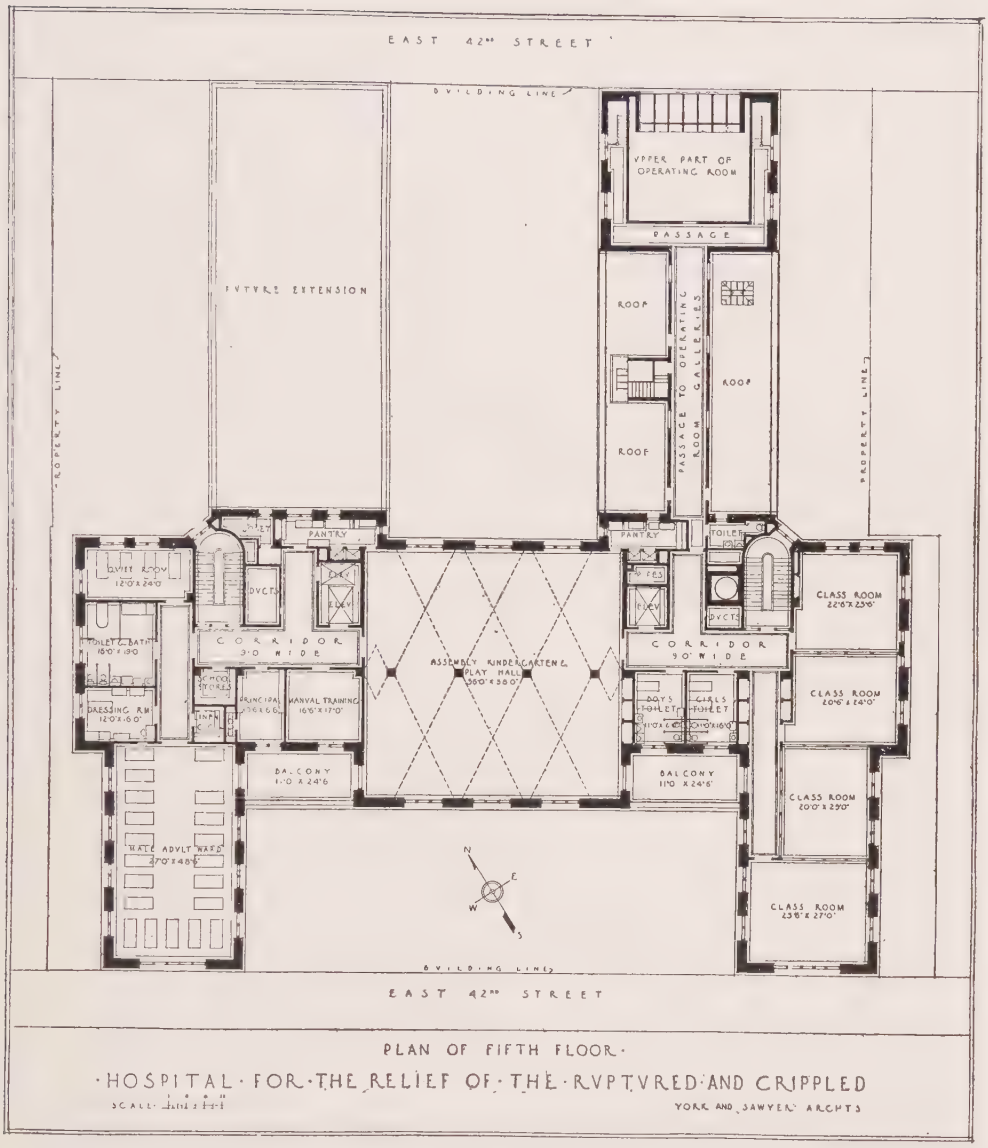

EAST 42ND STREET
BUILDING LINE
FOR FUTURE EXTENSION
PROPERTY LINE
PROPERTY LINE
OPERATING R.M.
OPERATING SUITE
SURGEON IN CHIEF
STAFF WASH ROOM
RECOVERY
ANESTHETIC
PANTRY
DUMB WAITER
ELEV.
PIPES & DUCTS
CORRIDOR
DINING ROOM
QUIET ROOM
TOILET BATH
DRESSING R.M.
LINEN
BOYS WARD
LOGGIA
VESTIBULE
EAST 42ND STREET
PLAN OF FOURTH FLOOR
HOSPITAL FOR THE RELIEF OF THE RUPTURED AND CRIPPLED
SCALE
YORK AND SAWYER ARCHTS

FIG. 187.



PLAN OF FIFTH FLOOR.

HOSPITAL FOR THE RELIEF OF THE RUPTURED AND CRIPPLED

SCALE 1/8" = 1'0"

YORK AND SAWYER ARCHTS

FIG. 188.

Courtesy, *The Modern Hospital*

FIG. 189. CHILDREN'S HOSPITAL, DENVER, COLO.
Maurice B. Briscoe, Architect. Dr. S. S. Goldwater, Consultant.

of the center, while a corresponding entrance on the right enters the executive department.

In the basement are the kitchen, the laundry, the heating plant, the brace shop, and storage for supplies.

On the first floor are the out-patient department and the administration department.

The second floor contains the living quarters for the superintendent, staff, housekeeper and graduate nurses.

On the third floor are the wards for girls and female adults, together with dining-rooms for patients.

The fifth floor plan is similar, except that the operating department is here located.

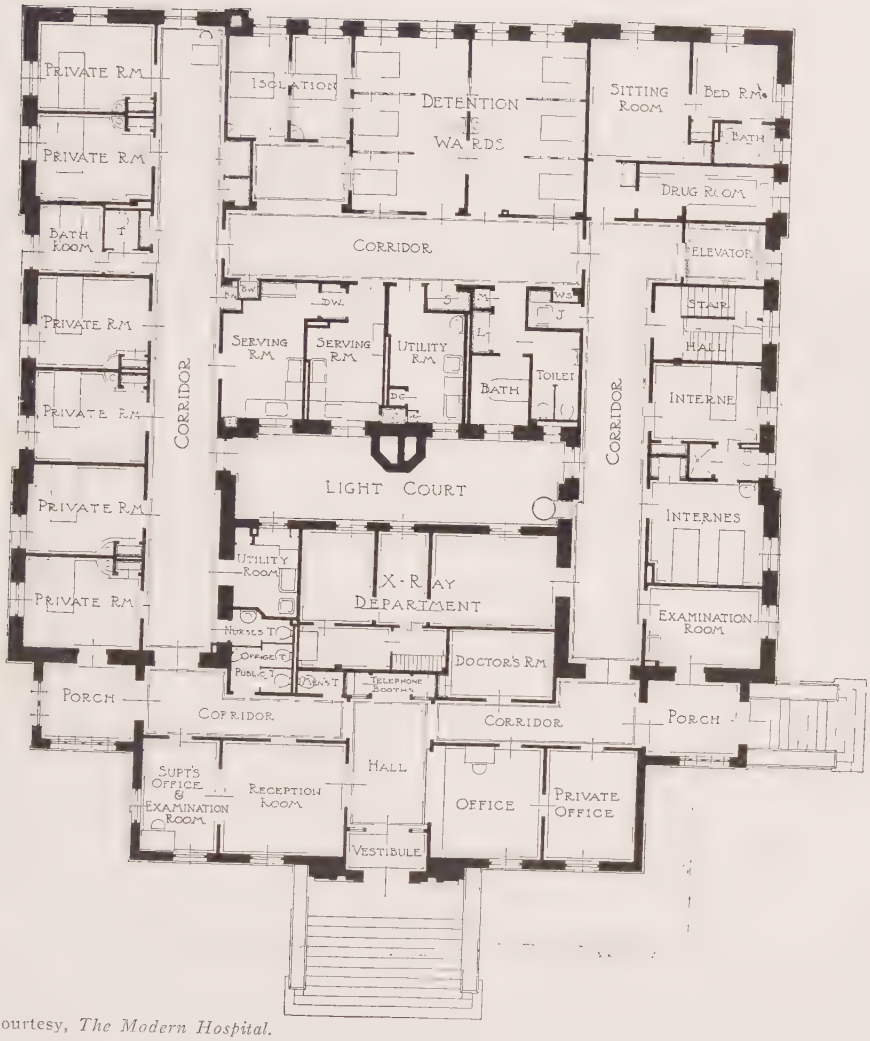
The fifth floor contains the class and school rooms and the large assembly halls for the children, while on the sixth are the great out-of-door wards and solariums.

The color scheme throughout is most pleasing and is most artistically carried out.

The *Children's Hospital,* Denver, Colo. (Figs. 189-193), which accommodates about seventy-five patients, has an unusual plan, being a U-shaped building above the first floor. It has complete facilities for caring for private and ward patients and for outdoor treatment. There is an excellent operating department and a good X-ray. Ample isolation rooms, so necessary in children's work, are placed in a separate corridor on the lower floor. A kindergarten room and bedside teaching for the children who wish to keep up their school work are features of the hospital.

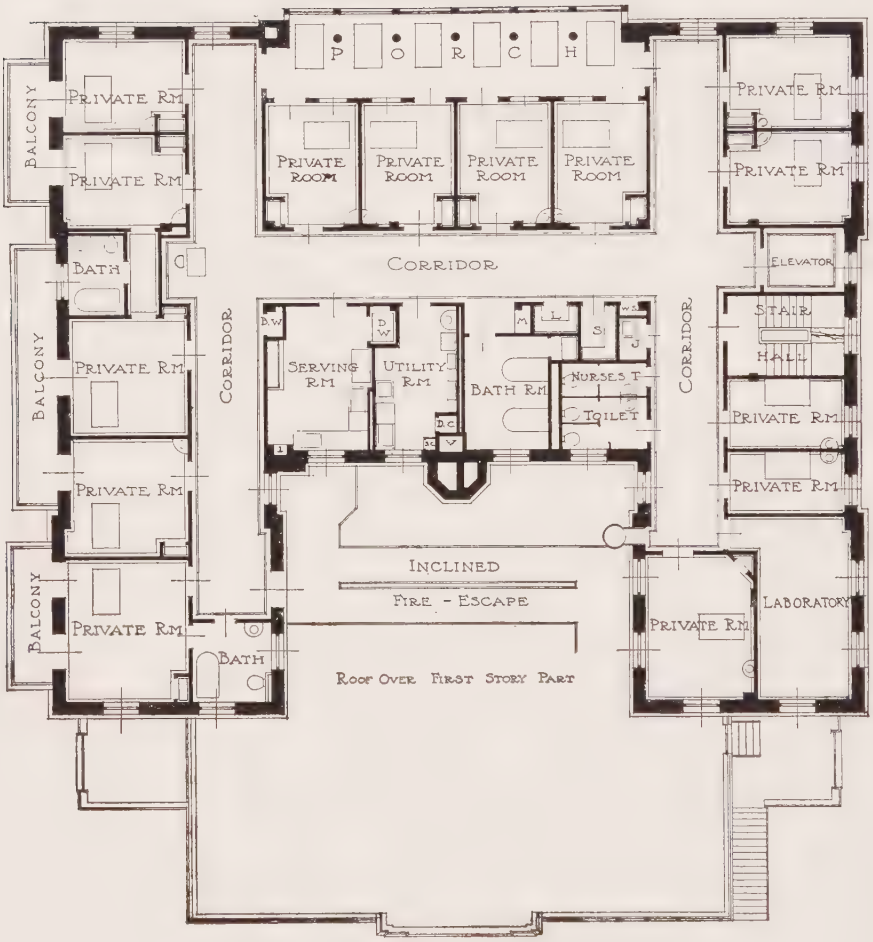
The *Heywood Hospital,* Gardner, Mass., built a dozen years ago, has recently added a small children's department. (Fig. 172.) It contains private rooms, wards, surgical dressing room, play room, large airing balcony, and a special wash room with high slab tub, low toilet and low wash basin. In the admitting ward, three cases can be kept under observation.

The *Children's Hospital,* Halifax, Nova Scotia, shows an addition to an existing building (Figs. 194 and 195) which doubles its capacity. In the basement, there is an isolation department for five or six patients, the main kitchen, dining room and a special milk room.



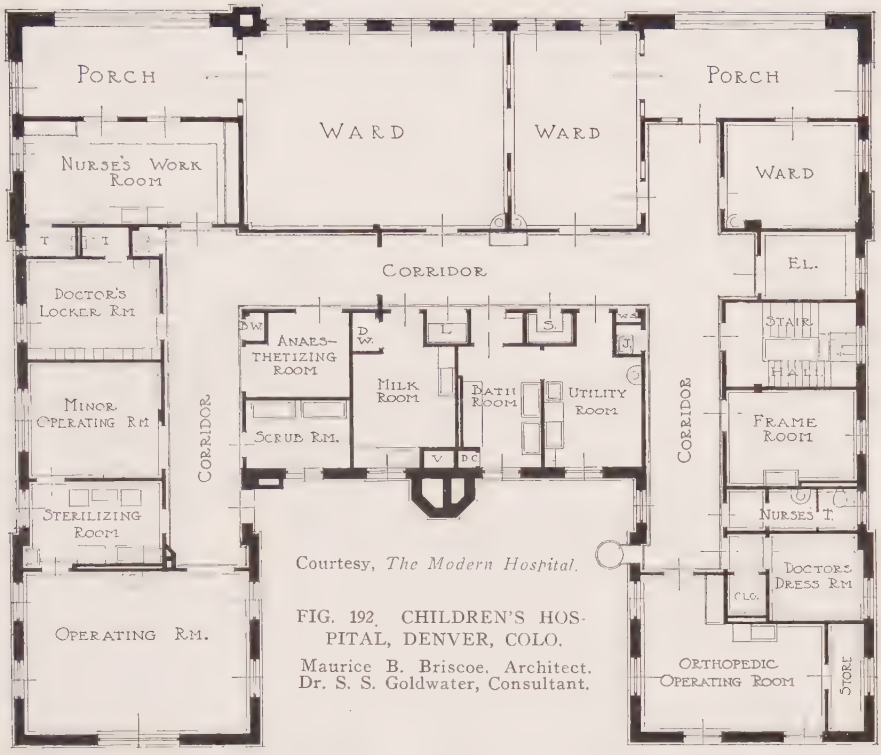
Courtesy, *The Modern Hospital.*

FIG. 190. CHILDREN'S HOSPITAL, DENVER, COLO.
Maurice B. Briscoe, Architect. Dr. S. S. Goldwater, Consultant.



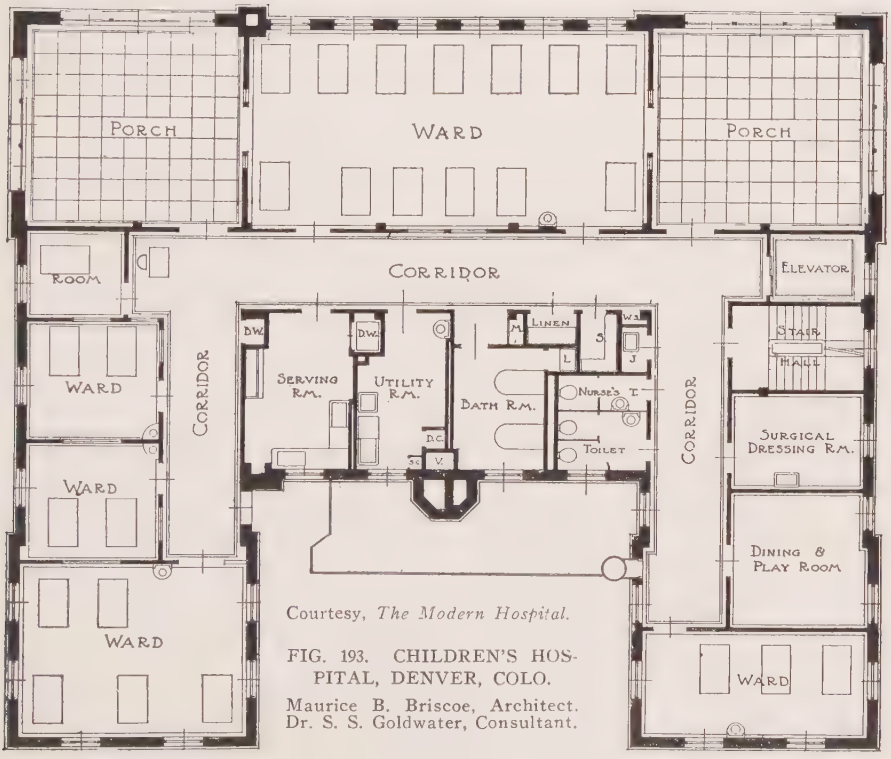
Courtesy, *The Modern Hospital.*

FIG. 191. CHILDREN'S HOSPITAL, DENVER, COLO.
Maurice B. Briscoe, Architect. Dr. S. S. Goldwater, Consultant.



Courtesy, *The Modern Hospital.*

FIG. 192. CHILDREN'S HOSPITAL, DENVER, COLO.
Maurice B. Briscoe, Architect.
Dr. S. S. Goldwater, Consultant.



Courtesy, *The Modern Hospital.*

FIG. 193. CHILDREN'S HOSPITAL, DENVER, COLO.
Maurice B. Briscoe, Architect.
Dr. S. S. Goldwater, Consultant.

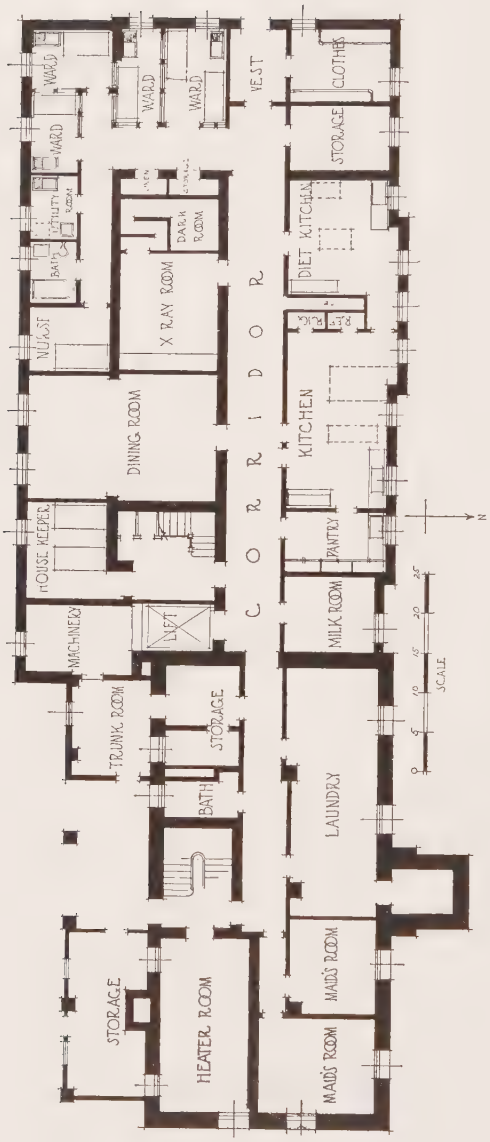


FIG. 194. GROUND FLOOR PLAN, ADDITION TO CHILDREN'S HOSPITAL, HALIFAX, N. S.
Stevens & Lee, Architects.

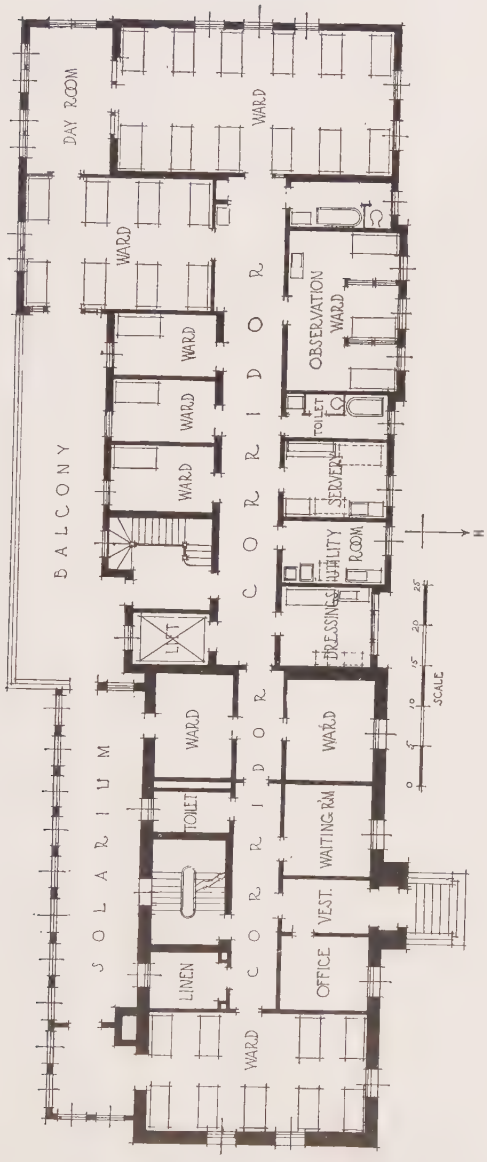


FIG. 195. FIRST FLOOR PLAN, ADDITION TO CHILDREN'S HOSPITAL, HALIFAX, N. S.
Stevens & Lee, Architects.

FIG. 196. WILHELMINA HOSPITAL, VIENNA, AUSTRIA. CHILDREN'S WARD.

The first floor is the main hospital; it provides wards, single rooms, a special three-part observation ward, a surgical dressing room, a day room, and a large balcony. On the second floor are the nurses' quarters.

The *Wilhelmina Hospital,* Vienna, Austria, has some good features. The illustration (Fig. 196) shows the division of a ward into cubicles. The pedestal at the left is the slab for bathing, the spray coming from above.

FIG. 197. CHILDREN'S HOSPITAL, MUNICH, GERMANY. WARD.

CHAPTER VIII.

The Department for Communicable Diseases

In all the large general hospitals of Europe, departments for the care of communicable diseases are provided and generally consist of separate, detached buildings, which are complete units divided into small wards with complete service rooms and equipment. Among those which are particularly interesting technically are those at Eppendorf, Virchow, West End Berlin, and Lindenberg-Cologne.

Perhaps no hospital in Europe has carried the newer principles of infection to a higher development than the Pasteur Hospital in Paris. In 1907, visiting this hospital for the first time, one saw, to his great surprise, cases of scarlet fever, measles, diphtheria, sleeping sickness and other communicable diseases side by side in one building, within plain view of the nurse and the visitor and separated from each other only by plate glass partitions. Our training had been that to care safely for contagious cases one must have at least a separate department, if not separate buildings. Still more surprising was it to find that while these various diseases were in the same building and being cared for by the same nurse, the record of the five years preceding my visit, with a service of nearly five thousand cases, showed the cross or internal infection to be only two to the thousand.

Friends are allowed to visit the patients, communicating with them from the open balcony provided for the purpose. This balcony extends in front of all rooms.

In an interview with Dr. Louis Martin, the director of the Pasteur, and from his book,* "Hygiene Hospitaliere," the writer gathered the following facts:

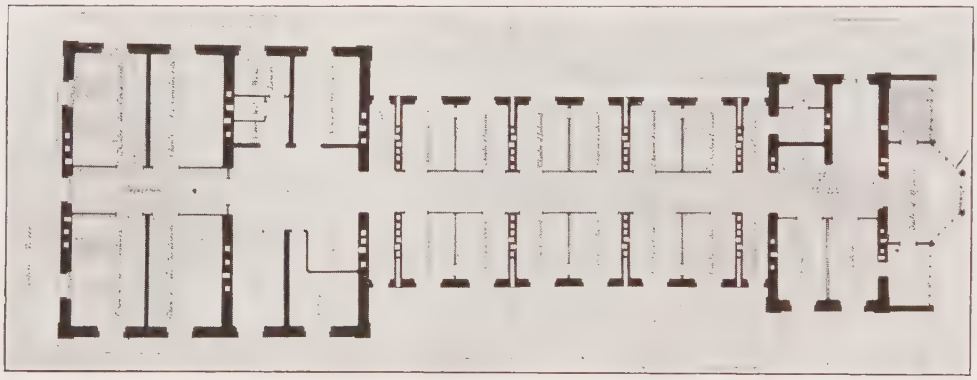


FIG. 198. PASTEUR HOSPITAL, PARIS, FRANCE. FLOOR PLAN.

(a) The service is divided into two sections—that for the very ill patients and that for convalescents. Between these two sections are the service rooms (Fig. 198) and fresh air passages, so that the patient must pass through an area of fresh air in being transferred from one department to another.

(b) In caring for all cases, the nurse wears a special gown for each room or cubicle, never removing the gown from the room except for cleansing.

(c) After handling the patient or

*"Hygiène Hospitalière," J. B. Baillière et Fils; Paris, 1907.

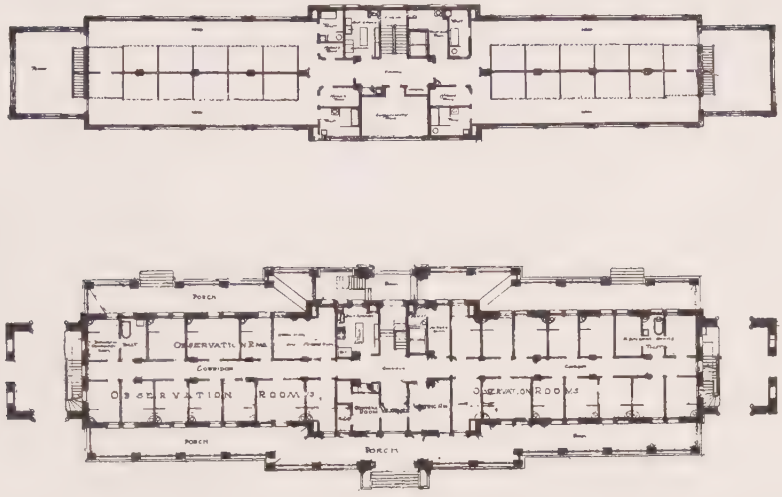


FIG. 199. WILLARD PARKER HOSPITAL, NEW YORK, N. Y. MEASLES PAVILION.

anything which the patient has touched, the nurse washes her hands thoroughly.

(d) All utensils are disinfected by boiling or otherwise.

This is Dr. Martin's description of the rooms.

"The partitions of the room are glazed to facilitate surveillance and to render isolation less irksome to the patient, for through the glass partitions the patient remains in contact with the world outside, which is a great comfort to him.

"The patient in his room ought to be sheltered from all cross infection, whether it be from the hospital or from outside. Everything which en-

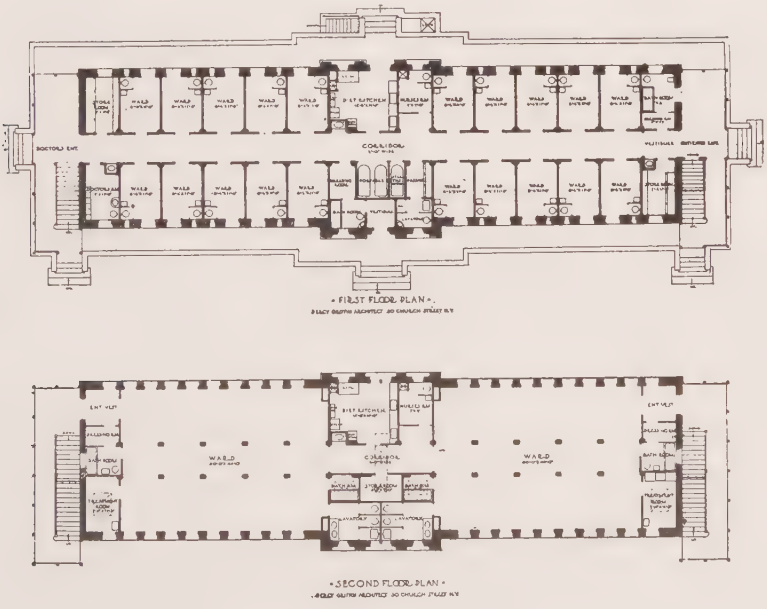


FIG. 200. KINGSTON AVENUE HOSPITAL, BROOKLYN, N. Y. ISOLATION PAVILION.

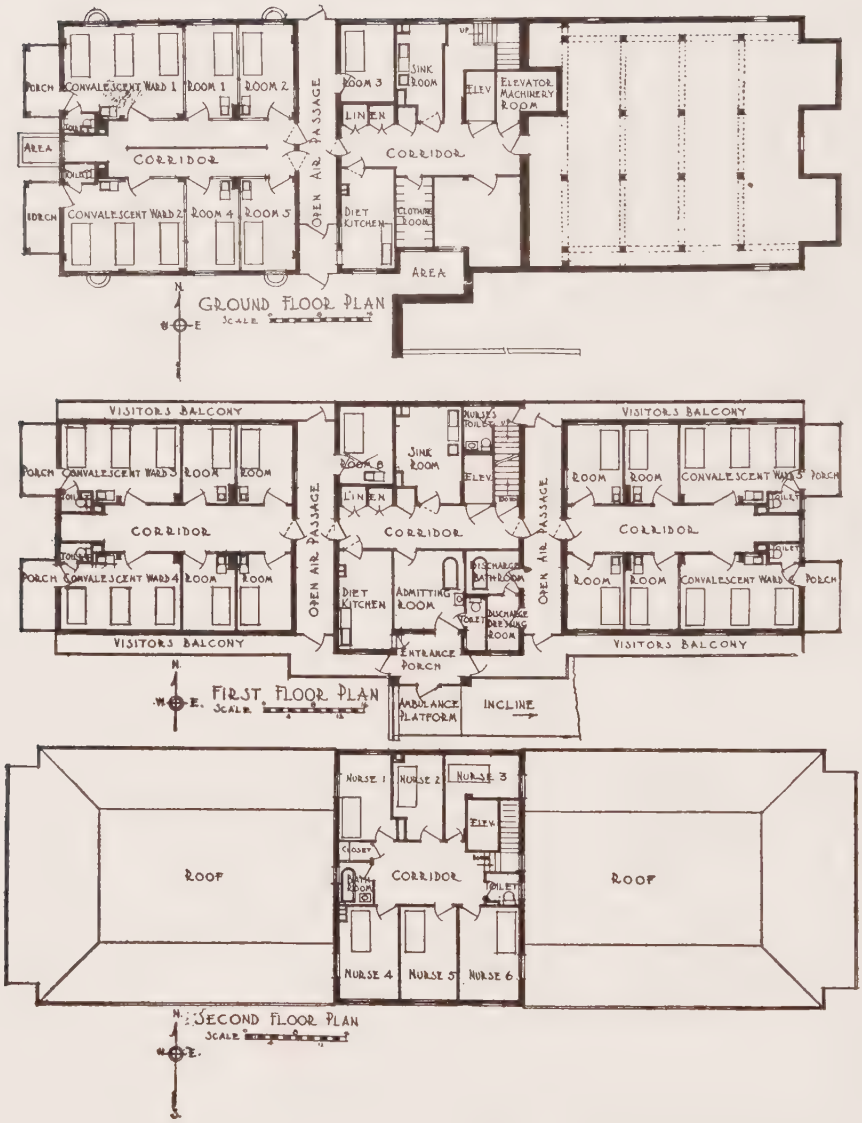


FIG. 201. WHITE ISOLATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect; Mellen C. Greeley, Associate.

FIG. 202. WHITE ISOLATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect; Mellen C. Greeley, Associate.

ters the room shall be sterile, or at least freed from all noxious germs. All that leaves his room must also be sterilized."

In other words, the laws of antisepsis and aseptic surgical technique must be observed.

On these principles many of our newer American hospitals for contagious diseases are now being built. The theory is that none, or comparatively few, of the communicable diseases is transmitted other than by contact, and the best authorities agree that true air-borne infection is very rare.

We should then plan our hospital for communicable diseases:

1st—So that the nurse or doctor, after contact with the patient, can have ample and immediate opportunity to scrub the hands.

2d—So that sterilizers can be provided for sterilizing every article that goes to the patient or is taken from the patient.

3d—So that provision can be made for the removal and destruction of waste, either by local incinerators or properly protected receptacles to convey to the general destroyer.

Then there must be the careful observance of strictly surgical technique—i. e., as in the surgical case the area around the open wound is clean, unless infected by contact with some unsterile instrument, or unclean hands, so the area around the infected patient is clean unless polluted by touch or contact from the patient or some one or something which the patient has touched.

Perhaps no man in this country has given more thought and study to this subject than has Dr. Chas. V. Chapin,* the Providence, R. I., Health Commissioner, ably assisted by Dr. D. L. Richardson, superintendent of the Providence City Hospital.† Here theory is

*"Sources and Modes of Infection."

†Dr. Richardson's excellent series of articles on "The Care of Infectious Diseases in Hospitals" was published in 1919 in The Modern Hospital.

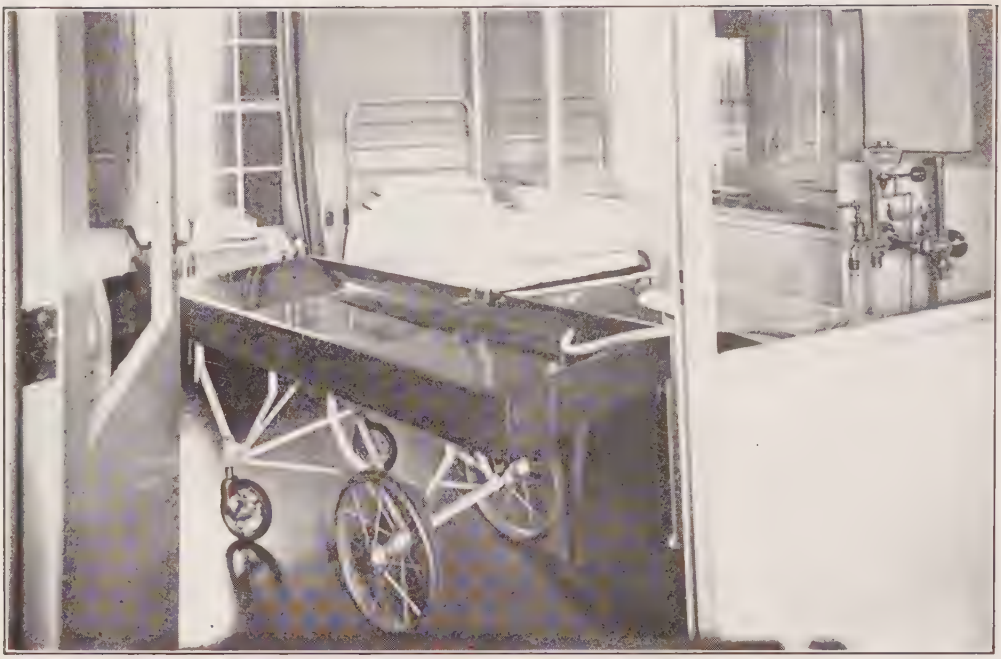


FIG. 203. ISOLATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
VIEW IN SINGLE ROOM.

FIG. 204. ISOLATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
THREE-BED WARD.

FIG. 205. OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.
CORRIDOR IN ISOLATION DEPARTMENT.

FIG. 206. HOSPITAL FOR SICK CHILDREN, TORONTO, CANADA. ISOLATION BUILDING.

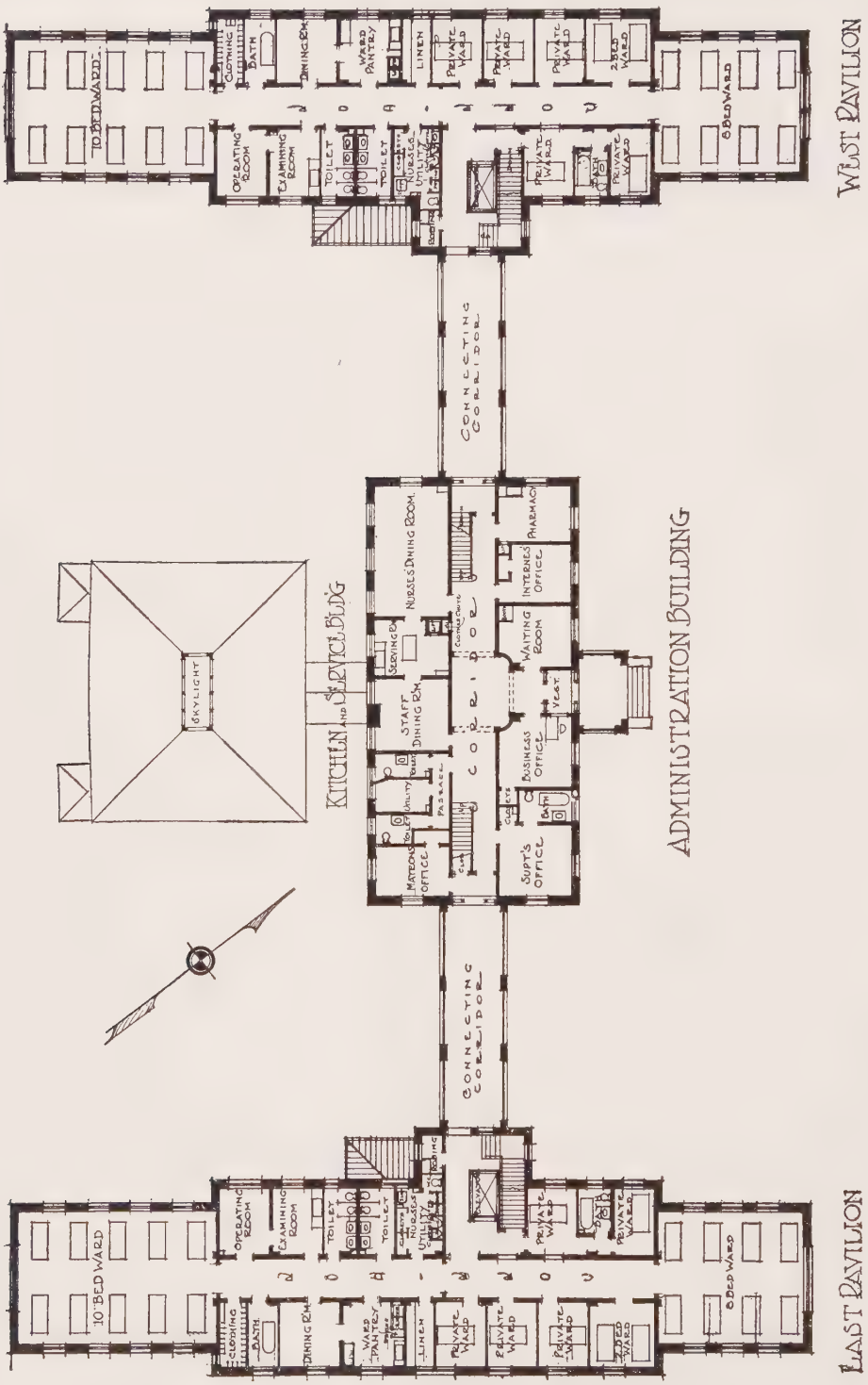


FIG. 207. JOHN C. HAYNES MEMORIAL, MASSACHUSETTS HOMEOPATHIC HOSPITAL, BRIGHTON, MASS.

Kendall, Taylor & Stevens, Architects.

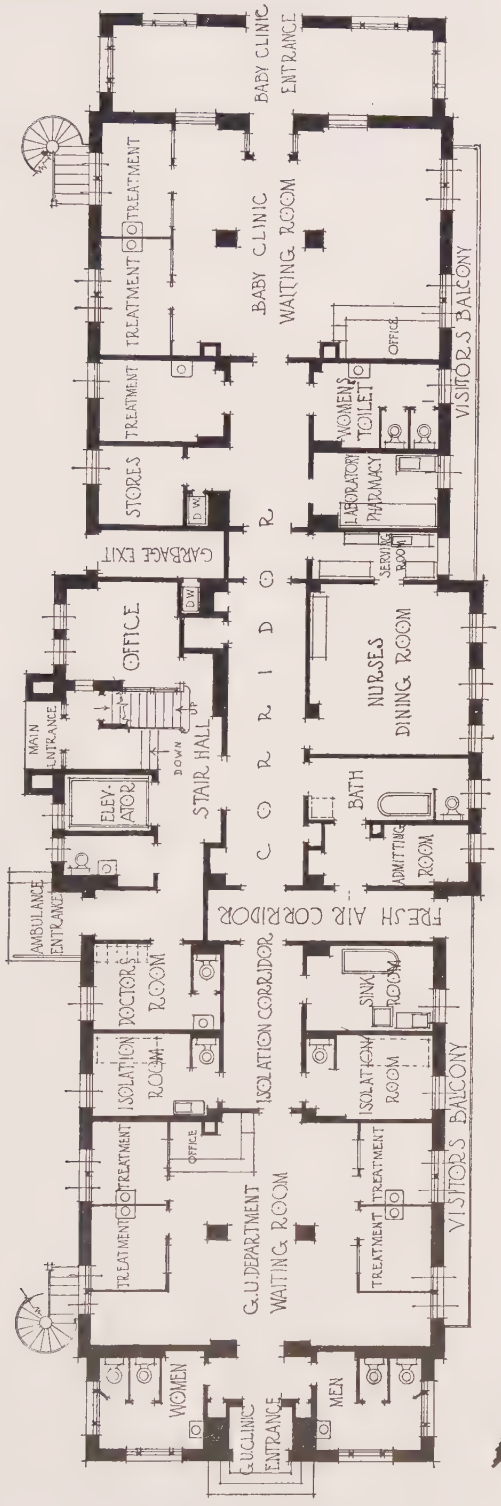


FIG. 208. GROUND FLOOR—JACKSON COUNTY ISOLATION HOSPITAL, JACKSON, MICH.
Edward F. Stevens, Architect.

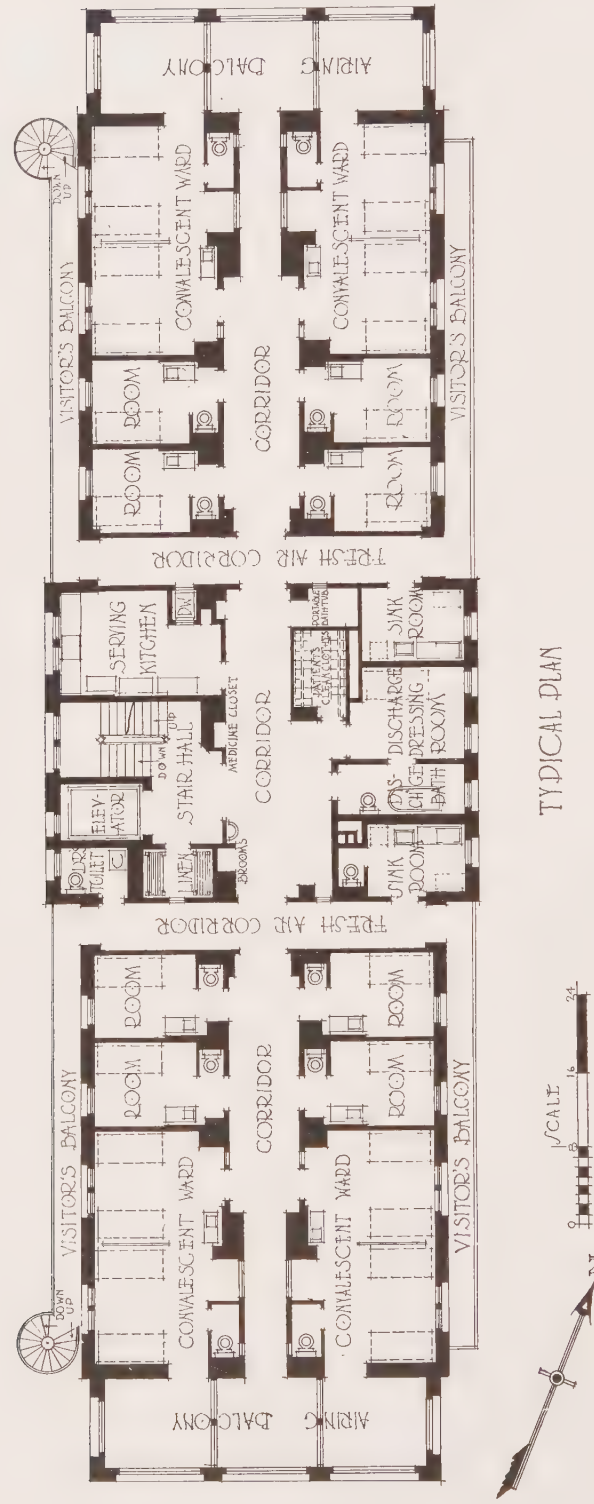


FIG. 209. TYPICAL FLOOR, JACKSON COUNTY ISOLATION HOSPITAL, JACKSON, MICH.
Edward F. Stevens, Architect.

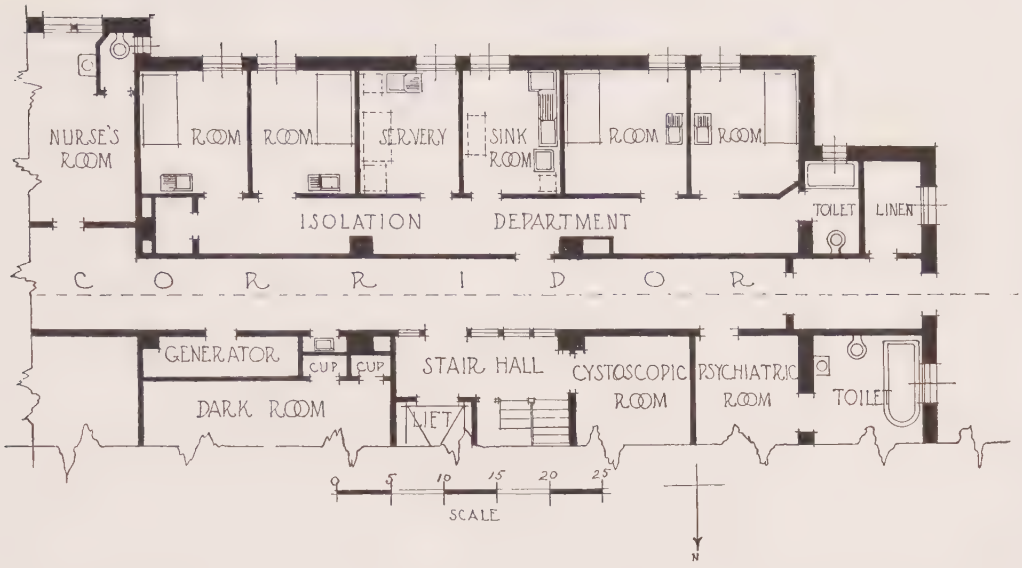


FIG. 210. ISOLATION DEPARTMENT, VICTORIA GENERAL HOSPITAL, HALIFAX, N. S.
Stevens & Lee, Architects.

supplemented by actual practice, with wonderfully satisfactory results.

In the receiving building of this hospital one will see in rooms adjoining one another, cases of scarlet fever, diphtheria, erysipelas, and measles, with the same physicians, and the same nurses administering to all, the latter eating in the same dining-room, living in the same nurses' home with nurses of other departments of the hospital.

As the service becomes larger or the diagnosis of the cases surer, then the grouping of the various diseases in different buildings becomes an economy, but the technique is never relaxed.

The buildings are ordinary ward units adapted to the care of communicable diseases by the addition of lavatories in each room and by other special equipment.

In special cases, visitors are admitted directly to patients' rooms, but are seated at a distance from the patient, instructed not to touch him, and are closely watched by a nurse during their stay.

One of the best planned isolation pavilions in this country is that recently built by the Department of Health of the City of New York at the *Willard Parker Hospital,* and used for a measles building (Fig. 199). Here, on the ground floor, one finds the best form of cubicle system. In addition to the special sink, lights, etc., each cubicle has a small well-ventilated toilet room entered from the room, containing a watercloset, making it unnecessary for the patient to leave the isolating room until he is convalescent or discharged.

The admitting pavilion (Fig. 200) of the *Kingston Avenue Hospital* of the Department of Health, City of New York, is well planned, providing for separate service and entrance from the ouside, if necessary, to every room on the ground floor. This, too, has separate toilets for each cubicle or room.

The contagious department of the *St. Luke's Hospital,* Jacksonville, Florida, consists of separate pavilions for white and colored (See general plan, Fig. 18).

The plan is an adaptation of that of the Pasteur Hospital of Paris (Fig. 198) and does away with all the cumbersome and elaborate arrangements of the old school (Fig. 201). All classes of contagious diseases, with the exception of smallpox, which is still cared for at a distance from other people, largely on account of popular prejudice, are treated in one building. There are single rooms

for fresh cases and wards for convalescents. The rooms are cubicles, with glass partitions for ease of observation, each cubicle being a separate entity, complete in itself. Correct technique, the so-called "aseptic nursing," prevents the spread of infection, but facilities must be provided for carrying it out.

The central portion of the building is the administrative department, being occupied by the admitting and discharge rooms and the various utilities, with the office of the nurse in charge. An open air cut-off separates this from the part occupied by patients.

Each room or ward is furnished with a scrub-up sink, with elbow faucets, so that after any service for the patient the physician and the nurse scrub and disinfect their hands before leaving the room They also wear gowns while caring for the patient, leaving them on hooks *inside* the door before they depart.

The equipment consists of utensil sterilizers, which can be opened by the foot; elbow handles for the faucets over slop sinks; dish sterilizers large enough to take a tray and its dishes; garbage incinerators which may be opened by elbow; liquid soap dispensers with pedal action; lever door handles which can be opened by elbow or upper arm; and everywhere scrub-up sinks with elbow handles. By means of these carefully worked out details the nurse is enabled to care for a patient, dispose of all waste material, and accomplish the disinfection of all utensils and appliances used in the process, without touching anything else. At the close of each procedure she sterilizes her hands and removes her infected gown, becoming clean again, to start upon the same round with another patient.

When a patient is admitted, he is bathed on the shallow tub-slab with a spray, so he gets what is practically a shower bath or shampoo in running water. He is then placed in a single room. When convalescent, he is transferred to the small ward, where there may be other patients recovering from the same disease. This ward is treated as a unit, but the aseptic technique is still carried out.

A portable tub (Fig. 203), similar in principle to the one in the admitting room, but made of wood covered with copper for lightness, set on a wheeled stretcher frame of the same height as the beds, is also provided. This may be taken to any room, the patient transferred to it, and bathed with a spray attached to the faucet at the scrub-up sink. A floor drain in each room receives the waste water from the tub. The tub is disinfected after each using.

When the patient has recovered and is to be discharged, he is taken through the open air corridor to the discharge room, given a cleansing and disinfecting bath, and passed into the dressing room, where he receives his own uninfected clothing. From this room he departs without coming into contact with other persons or parts of the buildings. (See also Figs. 203 and 204.)

Hospital finish of the simplest and strictest sort has been carried out in these pavilions and everything made so as to be easily cleaned. The furniture is extremely simple, the rooms having no more than a bed, a comfortable chair, and a table, besides the all-important sink or lavatory. These sinks were made special, being provided with an integral drain-board upon which to place hand brushes and other appliances.

The convalescent wards have toilets directly off them, and each has its own screened-in porch.

All floors are of cement, painted. Washable rugs are provided for the rooms of the convalescents.

Visitors are not allowed in the building, but there is a narrow balcony running in front of every room, like the Pasteur, so that parents and friends may come to the patient's window, see and talk with him, and know how he is getting on. This one provision probably does as much as any one thing to establish confidence in a contagious hospital.

Though there is considered to be no adequate reason why the nurses caring for contagious cases may not mingle with other nurses, it has been deemed wisest, at the present time, to house them in the isolation pavilion. The second floor, therefore, provides single rooms for six nurses, with baths, etc., these rooms being fully as commodious as

those at the nurses' residence. This floor has a separate entrance, through one of the open air corridors.

The pavilion provided for white persons has rooms for patients on two floors one accommodating twenty and one eleven patients.

The pavilion provided for colored persons accommodates eleven patients. It is an exact counterpart of the administration portion and one wing of the white pavilion.

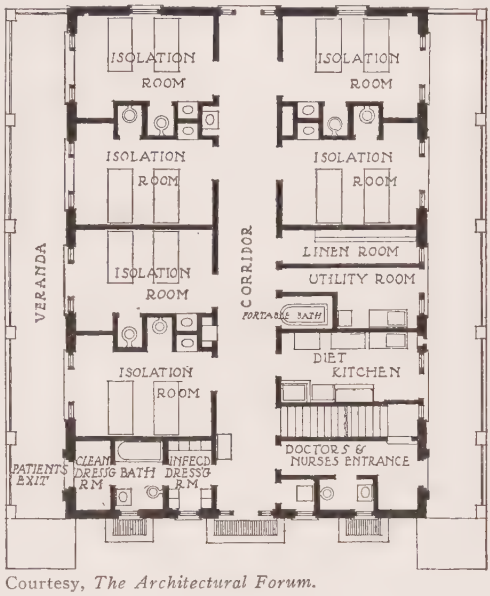
If the theory of isolation and the technique of care are correct, then infectious diseases can be safely cared for in the general hospital. This is now being carried out in the *Ohio Valley General Hospital.* While this department (Fig. 102) is in the main building, it is nevertheless isolated by a fresh air cut-off from the other rooms on this floor. Separate serving kitchen and sink room are provided as well as every facility for cleansing the person of the patient, for the work of the nurse, and all utilities. The nurse, after thoroughly cleansing her hands and changing the department gown, mingles freely with the other nurses of the hospital.

The isolation unit (Figs. 179, 206), of the *Hospital for Sick Children,* Toronto, Canada, has been developed on the Pasteur principle, or much like the Isolation Department of St. Luke's Hospital at Jacksonville, with air cut-offs between the acute, the service, and the convalescent departments. Each cubicle is provided with the sink described in the Jacksonville Isolation. Food is delivered in the open corridor through a window to the serving kitchen. Under this window is the dish sterilizer, the cover of which is controlled from either side of the wall.

Small operating rooms are provided in each story. A separate staircase is also provided for the discharged patients, leading from the discharge room or cross corridor.

The contagious department of the *Massachusetts Homeopathic Hospital* at Brighton (Fig. 207) provides for all classes of communicable diseases. The plan consists of a three building unit, connected by open corridors. The general administration building is in the center, flanked by the ward units.

The *Jackson County Isolation Hospital,* Jackson, Mich., is planned for four floors like the one shown (Fig. 209). The unit can easily be adapted to a building of any height. The center is the service portion, and is kept uninfected. It has an open-air corridor which divides it from the ends, which are the parts occupied by patients. In each patients' section there are four single rooms and two



Courtesy, *The Architectural Forum.*

FIG. 211. ISOLATION BUILDING, HURLEY HOSPITAL, FLINT, MICH.
Davis, McGrath & Kiessling, Architects.

wards with two-bed cubicles. Each ward has a special scrub-up sink with elbow-control faucets; each has its own toilet, those in the private wards being shut off by a washable curtain instead of a partition. The balcony is divided into three sections, one for each ward and one opening from the corridor. Visitors' balconies run the full length, and are accessible only from outside the building.

The sink rooms, which are included in the service portion of the unit, open on the fresh-air cut-off. The commodious discharge rooms are noticeable, being designed so that two or more patients may be discharged almost at once, or that a patient may have a comfortable place to rest while awaiting the conveyance to

Courtesy, *The Architectural Forum.*

FIG. 212. HURLEY HOSPITAL, FLINT, MICH. ISOLATION BUILDING. EXTERIOR.
Davis, McGrath & Kiessling, Architects.

take him home. There is a good serving kitchen, a linen room, a room for patients' clean clothing, and special toilets for doctors and nurses.

In the central portion of the ground floor is the admitting department. In the right wing is the children's out-patient department; in the left wing is the genito-urinary clinic, with rooms for the isolation and care of venereal cases (Fig. 208).

The isolation department of the *Victoria General Hospital,* Halifax, N. S. (Fig. 210), provides for patients in separate small rooms or cubicles, each being complete. It has a special serving kitchen and utility rooms. The double-action plumbing fixtures make proper technique easy.

The *Children's Hospital* at Halifax, N. S. (Fig. 194), has in its isolation department a special room for a nurse, if it is desired to isolate her along with the patients. The *Ottawa Civic Hospital,* Ottawa (Fig. 80), the *Notre Dame Hospital,* Montreal (Fig. 87), and the *Good Samaritan Hospital,* Sandusky, O. (Fig. 320), present examples of small isolation departments in general hospitals which can be administered without disturbing the rest of the institution.

The plan of the isolation building of the *Hurley Hospital,* Flint, Mich. (Figs. 211, 212), was developed in collaboration with Dr. S. S. Goldwater, of New York. It shows a unit designed for twelve patients, in two-bed wards. Each ward is an independent unit, with toilet and scrup-up facilities, and an exit to the terrace outside. A portable tub is provided for bathing. The second floor, which houses three nurses and a maid, has a separate entrance; it provides a sitting room, dining room and kitchen.

The plan of an isolation ward for *army hospitals,* shown in the appendix (Fig. 13), gives a simple plan for carrying out an effective technique with a considerable number of patients. Two-bed cubicles and single rooms are provided, visitors' galleries, and all utilities.

In hospitals which desire to isolate *venereal* cases, a department arranged as for other communicable cases may be modeled after some of the plans already given.

CHAPTER IX.

The Psychopathic Department

Since the beginning of this century, no greater development has been made in any branch of hospital housing and treatment than in the psychopathic and neurological departments.

Only a few years ago the person who was adjudgd insane was committed to an asylum; and if resistance were offered he was placed in irons and half starved. The mild cases were herded with the violent—"herded" is the only name for it—and they were treated more as beasts of the field than as human beings whose course of thought was diverted through some slight lesion. The scientific study of the disturbed patient has shown that in most cases the modern or humane treatment is productive of the greatest success; and phychopathic hospitals, either as independent institutions or as departments of a general hospital, are being considered everywhere. The psychopathic hospital then become a clearing-house for the study and segregation of cases.

Whether or not a general hospital should have a psychopathic department must be settled by local conditions, the interest of the men on the staff, etc. Since insanity and nervous conditions are said to be on the increase, and more attention is being paid to the care and cure of "borderline" mental cases, it would seem necessary for large hospitals to make some definite provision for these cases. It is quite certain that mental cases cannot be properly cared for among other patients, nor by nurses and attendants unfamiliar with their special requirements. A separate building or department appears to be the only solution

In any event, some provision should be made in all general hospitals for the proper isolation and protection of *delirious* patients. One or two rooms can be arranged for, situated so as not to disturb other patients, with windows properly guarded. Such departments are shown on the ground floors of the Ross pavilion of the *Royal Victoria Hospital,* Montreal (Fig. 114), the *Ohio Valley General Hospital,* Wheeling, W. Va. (Fig. 99), and the *Ottawa Civic Hospital,* Ottawa (Fig. 79).

In this department more than in any other in the hospital it is essential to consider the environment of the patient; the interior must be restful; there must be nothing in color or design to excite the patient; the surroundings must be homelike, with as little of the institutional appearance as possible. Great care should be used, however, to avoid giving any opportunity for the patient to inflict personal injury, by providing non-projecting hardware; turned-down door handles; flush transom bars; lighting fixtures out of reach, with no projections; small lights of plate glass in windows, which never open enough to admit the body of a person; special plumbing fixtures, firmly secured; and cabinets for telephones and service built into and not projecting from the wall.

In the *Psychiatric Clinic* at Munich, Germany (Figs, 213, 214), one hundred and fifty patients are cared for, divided into first, second, and third classes, according to the service and accommodation. Every class is provided with special visiting-day rooms wherein patients may receive their friends.

Those in the first class have private rooms. For this accommodation, with services of nurse and doctor, they pay eleven marks ($2.75) per day. Every attempt is made to make the apartments homelike, and no visible form of restraint is noticed.

The second class patients have less luxurious accommodations but have comfortable living rooms and sleeping quarters, for which they pay six and one-half marks ($1.63) per day.

The third class patients occupy wards at three marks ($.75) per day. The

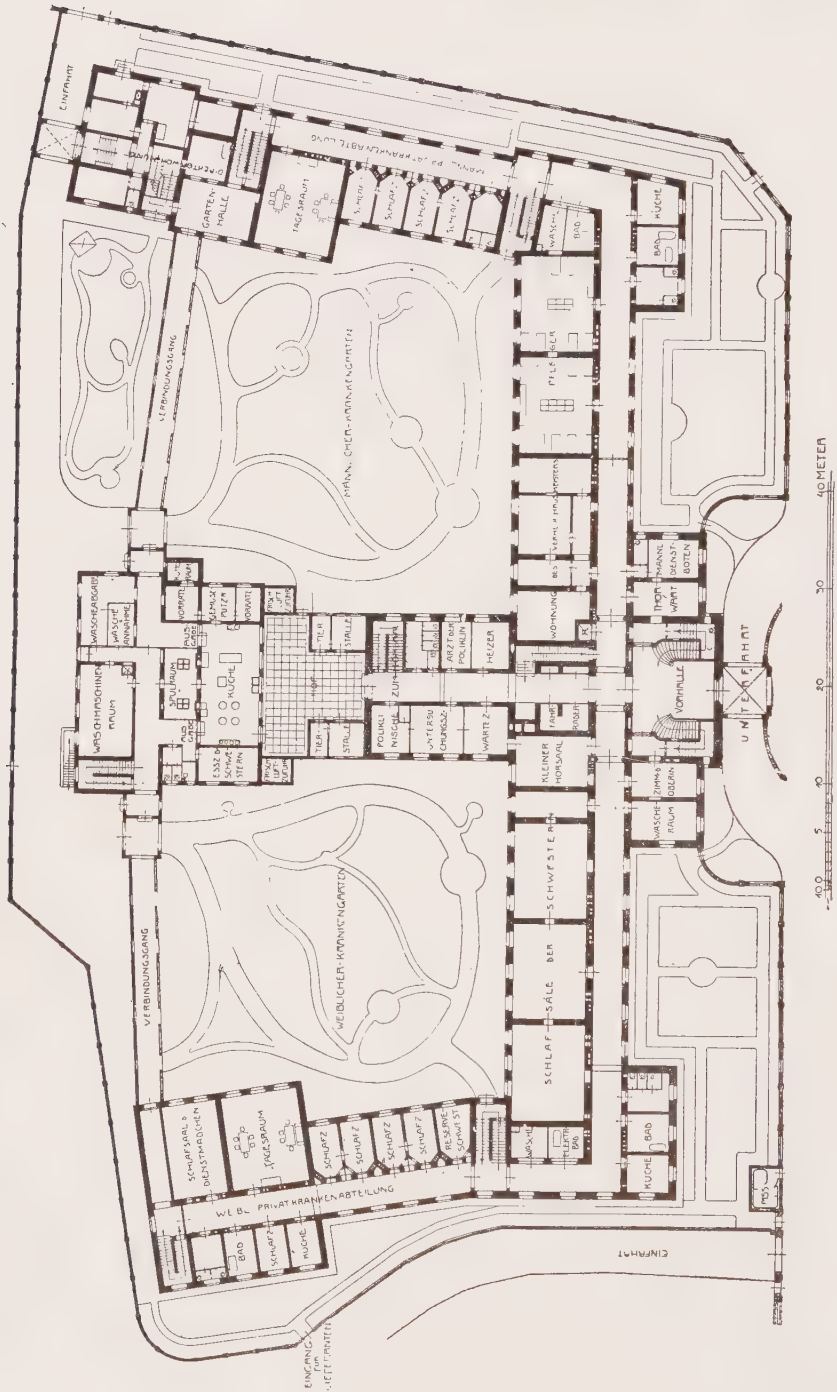


FIG. 213. PSYCHIATRIC CLINIC, MUNICH, GERMANY. GROUND FLOOR.

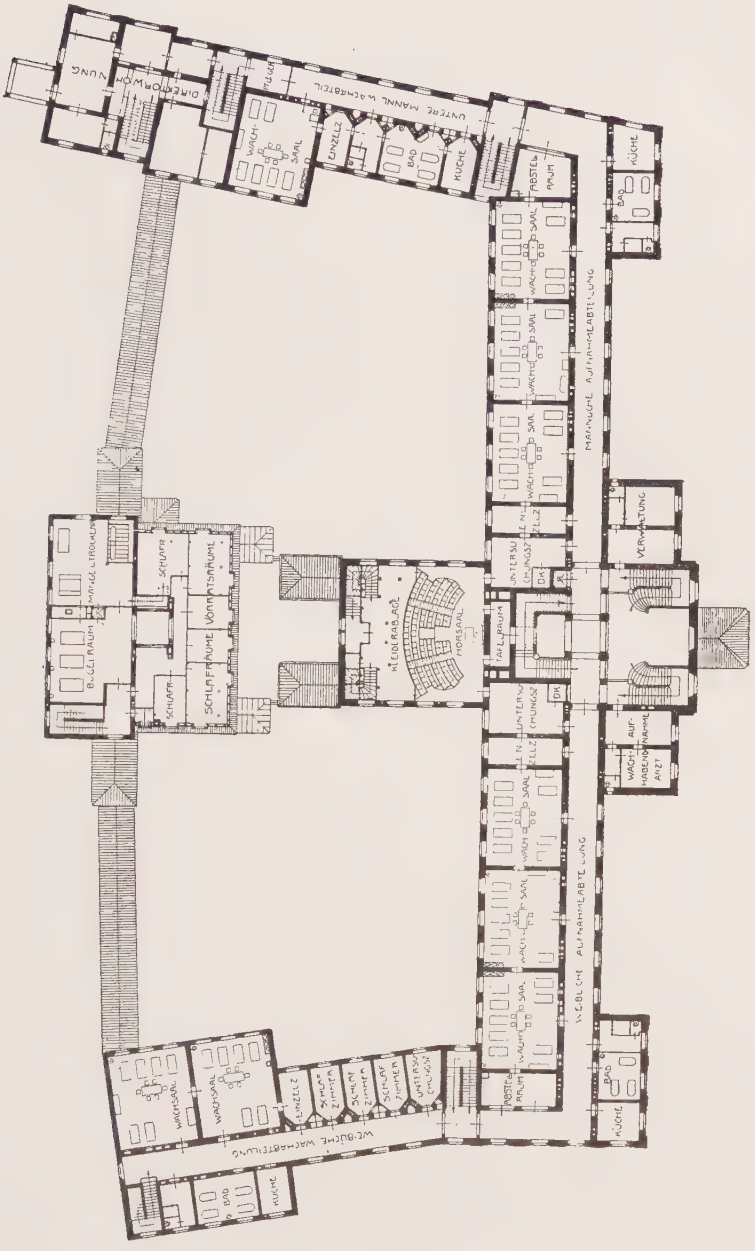


FIG. 214. PSYCHIATRIC CLINIC, MUNICH, GERMANY. FIRST FLOOR.

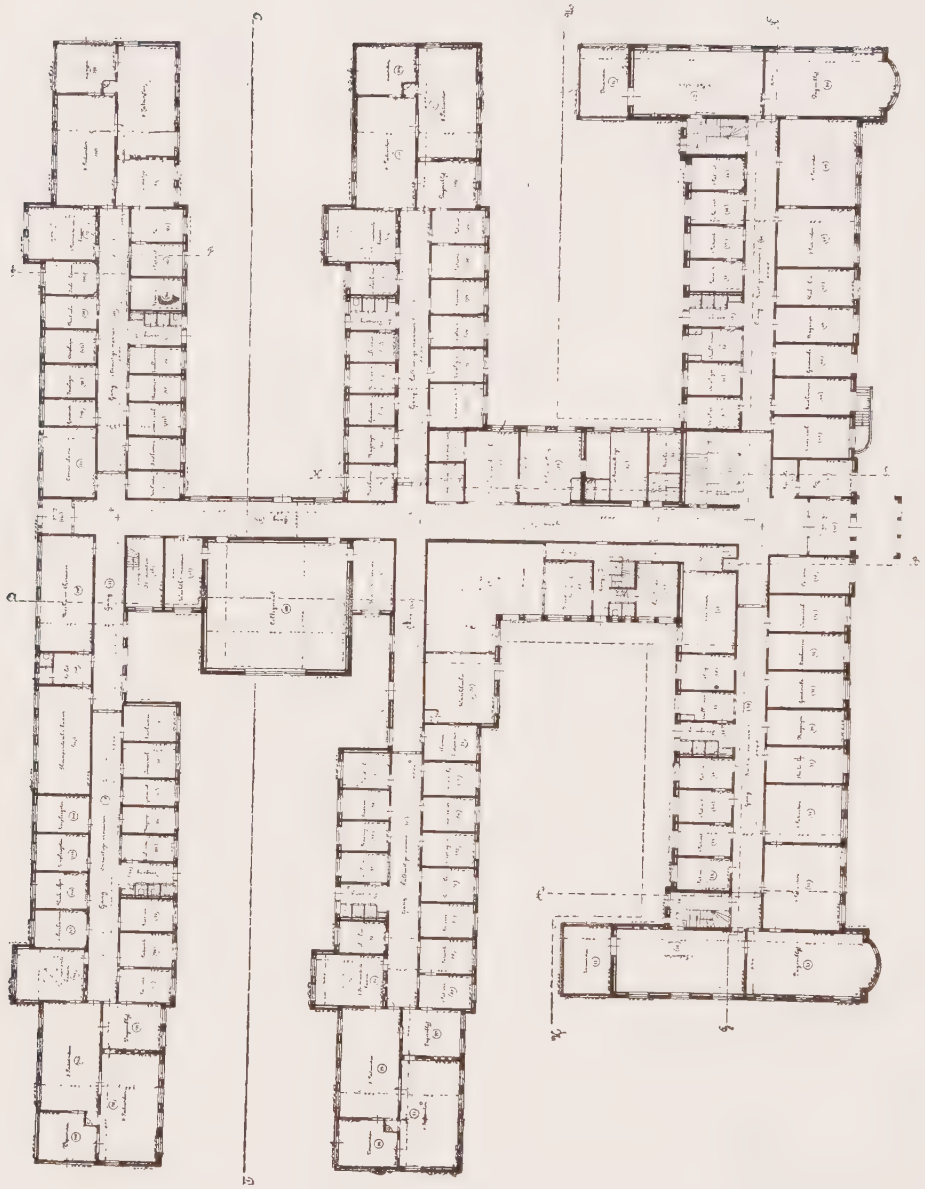


FIG. 215. PSYCHIATRIC-NEUROLOGICAL CLINIC, UTRECHT, HOLLAND. GROUND FLOOR.

wards are neat and well kept, and toilets are provided in every ward unit.

The details of construction are most carefully worked out. The door frames are of iron, with no projection; all door handles are turned down, affording no way to cause injury; all cabinets are of steel, placed flush with the wall; the telephones are enclosed in cabinets, and signal is given by a red light, no bells being used.

In the new Psychiatric Clinic of the State University of *Utrecht,* Holland (Figs. 215-219), Professor Heilbronner has worked out some excellent ideas. One hundred patients are accommodated and all are placed on the first floor, which is divided into six sections—three

FIG. 216. PSYCHIATRIC-NEUROLOGICAL CLINIC, UTRECHT, HOLLAND. SECOND FLOOR.

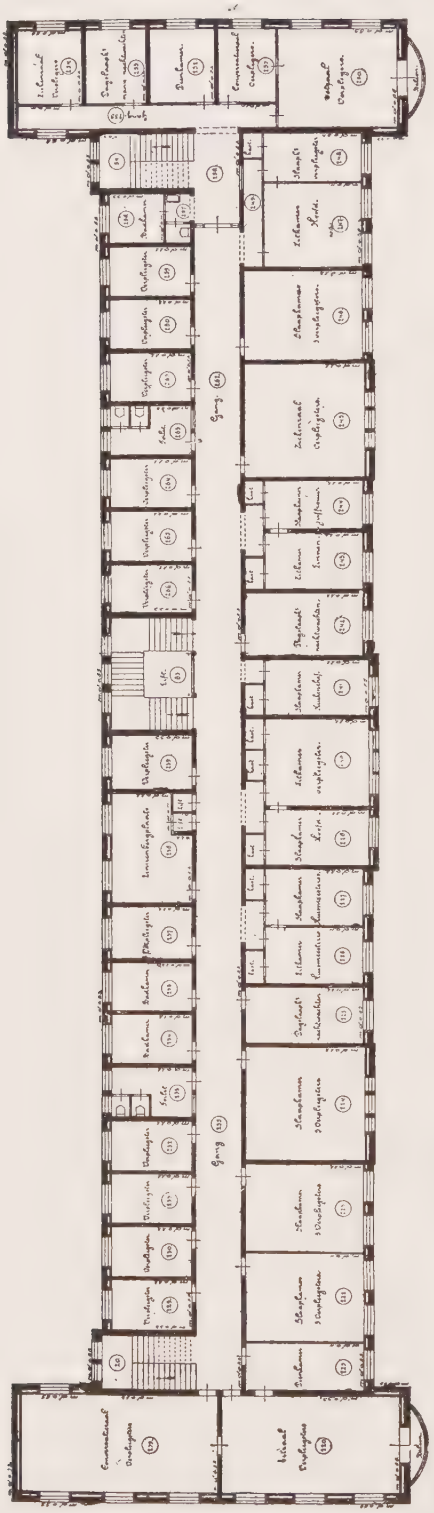


FIG. 217. PSYCHIATRIC-NEUROLOGICAL CLINIC, UTRECHT, HOLLAND, THIRD FLOOR.

FIG. 218. PSYCHIATRIC-NEUROLOGICAL CLINIC, UTRECHT, HOLLAND. CORNER OF WARD.

for women and three for men—and classified according to condition.

The offices, laboratories, etc., are located on the second and third floors of the main building.

While this is strictly a pavilion type of hospital, all sections are connected by a common corridor, adjoining which is the working or domestic side of the institution, the kitchens, dining-room, together

FIG. 219. PSYCHIATRIC-NEUROLOGICAL CLINIC, UTRECHT, HOLLAND. DAY ROOM.

FIG. 220. MASSACHUSETTS PSYCHOPATHIC HOSPITAL, BOSTON, MASS. VIEW FROM THE FENS.
Kendall, Taylor & Co., Architects.

with lecture rooms, etc. Each one of the patients' sections is supplied with the necessary utensils and equipment; each has an examining room, so arranged with curtains that it can be changed into a dark room; also a linen room, store room, sink room, tea kitchen, bath rooms, day room, and airing balcony.

The bath rooms are centrally located and can be reached readily from the wards or single rooms. For the convenience of the wards, a corner water-closet is provided, so screened as not to be objectionable, at the same time keeping the patients under the surveillance of the attendant.

There are no large wards in any section, six beds at most.

In the neurological section, where less surveillance is needed, the rooms are separated by single doors; while in the psychiatric sections the wards are divided by large sliding doors, making it easier for the night watch.

In the psychiatric sections, three baths to every thirteen beds are provided. The control for these baths is behind locked cabinet doors, and if the temperature of the water varies beyond certain limits an electric alarm summons an attendant.

In each psychiatric section is provided an isolation room with rounded corners, fastened-down toilet, protected lights, and protected double doors with an observation window. The windows are made of swinging sash, divided by heavy reinforced sash and glazed with heavy plate glass. The floors are covered with linoleum.

The administration offices, the laboratories, and the sleeping quarters for the attendants are on the second and third stories.

A large photographic gallery is arranged for cinematography, and has special lights arranged for night photography.

These two examples will show something of the development of the psychopathic hospital in Europe; but there every large hospital has its own psychopathic department, large or small, as the needs and development dictate.

In this country the first psychiatric hospital, especially designed for the purpose, was that of the University of Michigan,

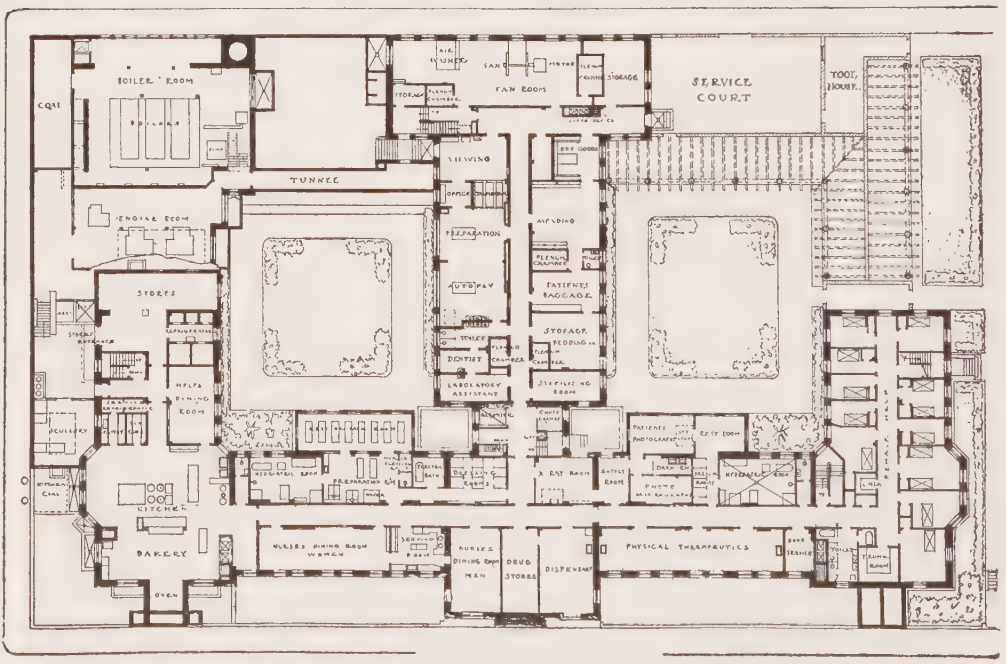
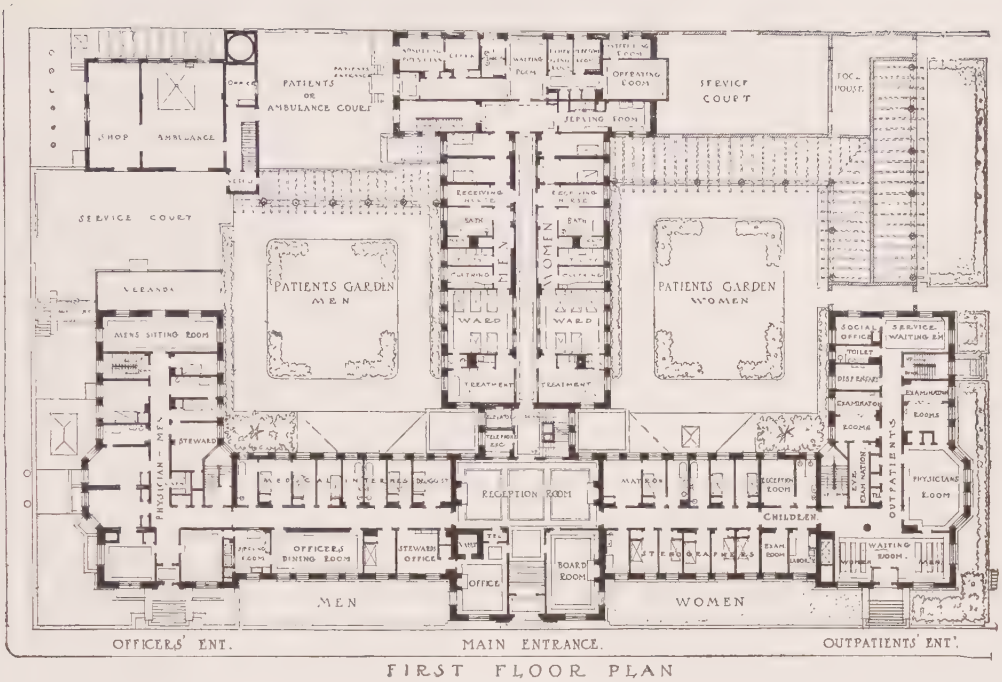
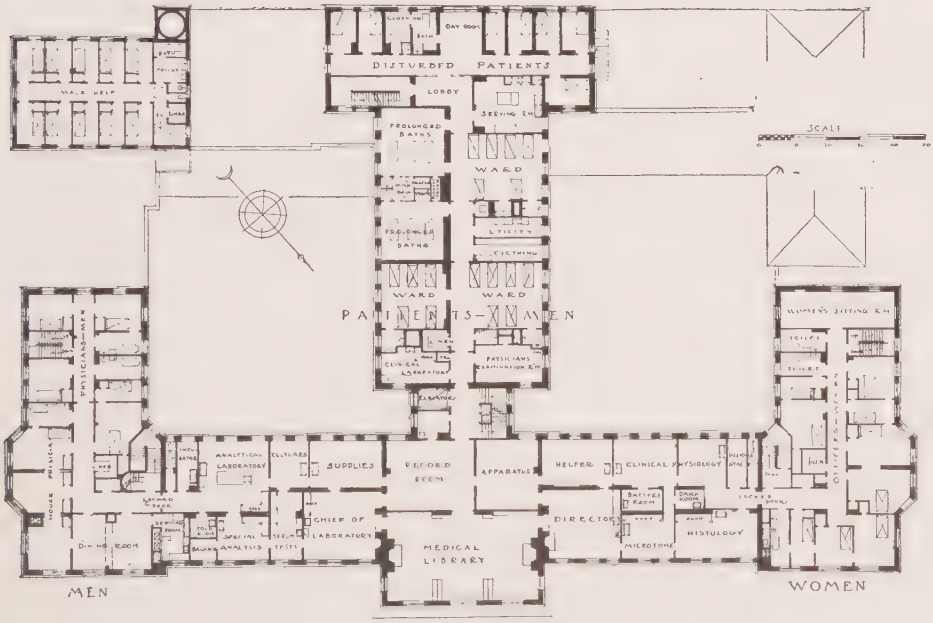


FIG. 221. MASSACHUSETTS PSYCHOPATHIC HOSPITAL, BOSTON, MASS. GROUND FLOOR.
Kendall, Taylor & Co., Architects.



FIRST FLOOR PLAN

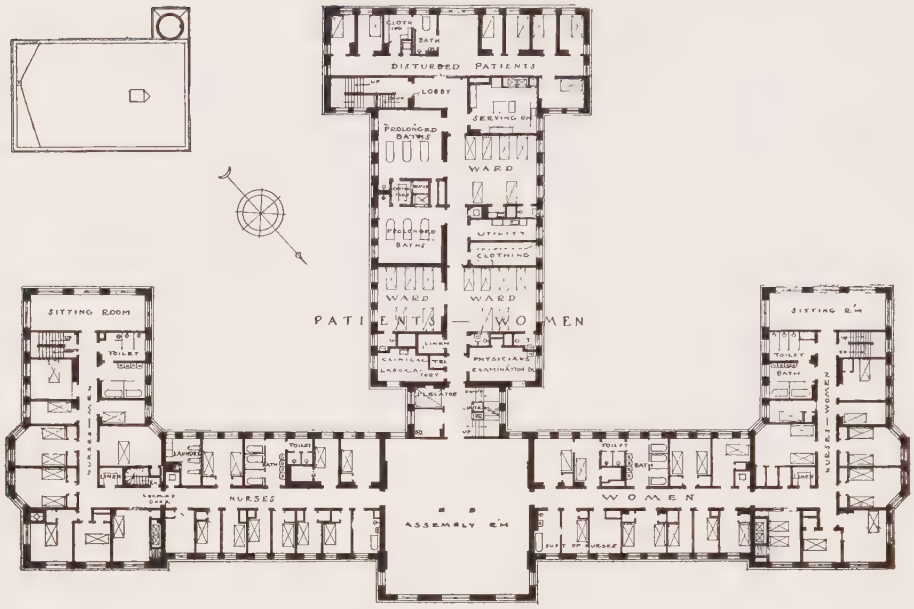
FIG. 222.



SECOND FLOOR PLAN

FIG. 223.

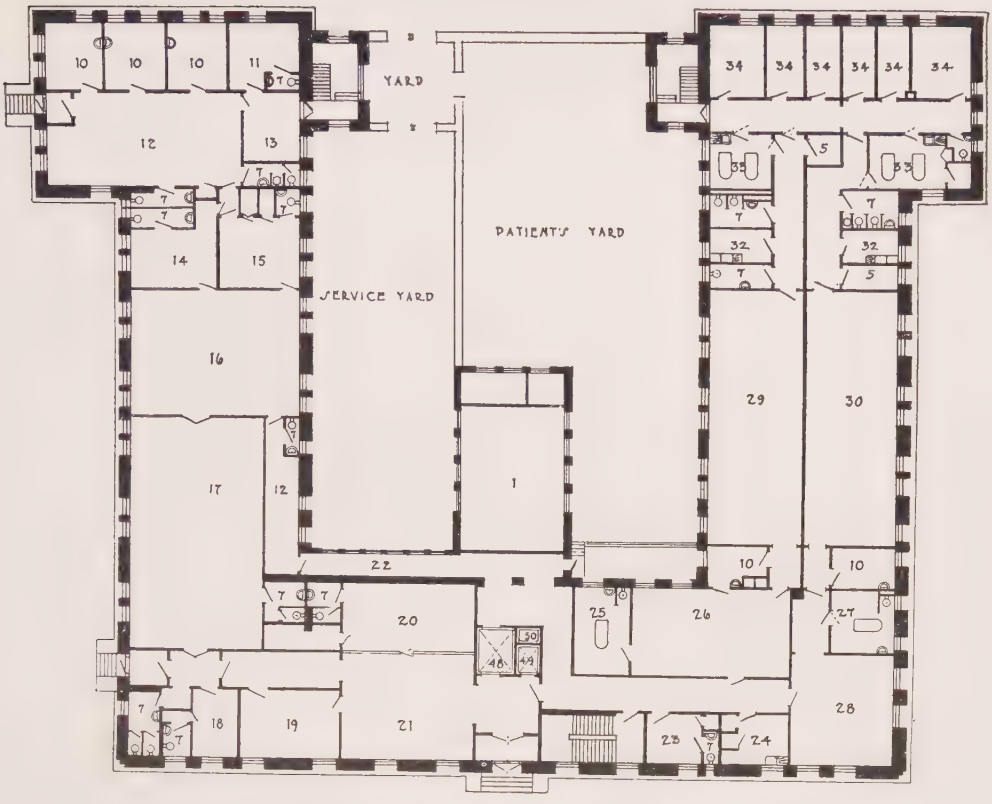
MASSACHUSETTS PSYCHOPATHIC HOSPITAL, BOSTON, MASS.
Kendall, Taylor & Co., Architects.



THIRD FLOOR PLAN
FIG. 224.

FOURTH FLOOR PLAN
FIG. 225.

MASSACHUSETTS PSYCHOPATHIC HOSPITAL, BOSTON, MASS.
Kendall, Taylor & Co., Architects.



Courtesy, *The Modern Hospital*

FIG. 226. PSYCHOPATHIC BUILDING, COOK COUNTY HOSPITAL, CHICAGO, ILL. FIRST FLOOR PLAN.

Richard E. Schmidt, Garden & Martin, Architects.

at Ann Arbor, built in 1906. It has a capacity of sixty-two beds.

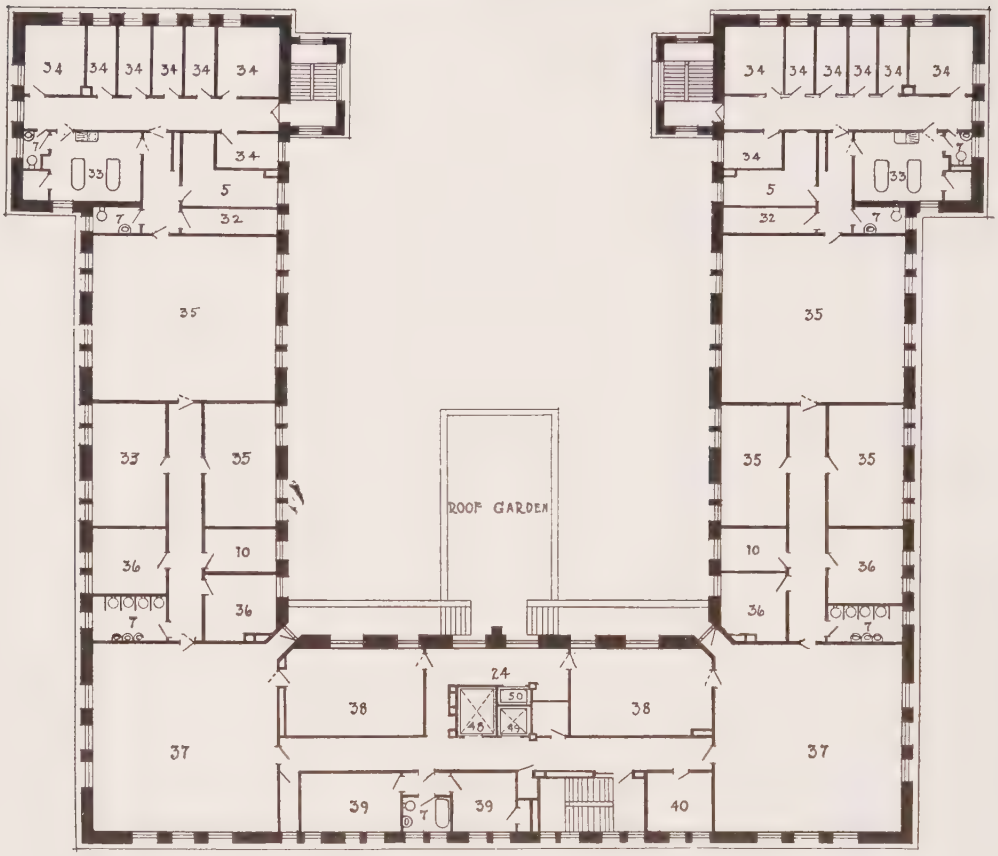
In 1911 the State of Massachusetts appropriated the sum of six hundred thousand dollars, to be expended in the building of the *Massachusetts Psychopathic Hospital,* in the City of Boston. The site selected was in what has come to be known as the "hospital district" of Boston, located in close proximity to the Harvard Medical School, the Peter Bent Brigham Hospital, the Infants', the Children's, the Good Samaritan, the New England Deaconess, the Robert Brigham, the Channing, the Huntington and other hospitals.

The work was intrusted to Henry H. Kendall, architect, under the direction of Dr. Owen Copp, executive officer of the State Board of Insanity.

The development of this institution in Massachusetts has given the State a magnificent psychopathic building which forms the clearing-house, as it were, for the larger insane institutions throughout the state.

The building is E-shaped, a plan giving the greatest number of rooms exposed to the best light and air. It is four stories in height and will accommodate one hundred and ten patients. The patients are generally admitted at the ambulance entrance on the first floor, leading from the side street.

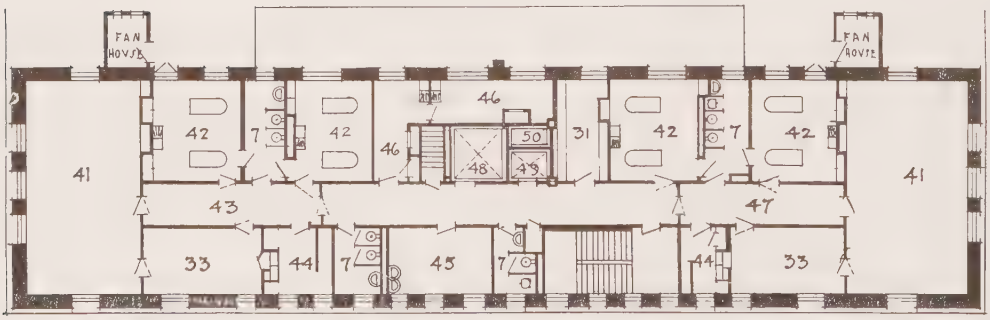
On the first floor (Fig. 222) there are two admitting units, one for each sex, divided by a general corridor. These units consist of two admitting wards of five beds each, general treatment rooms, baths, isolation rooms, etc. Connected



Courtesy, *The Modern Hospital*

FIG. 227. PSYCHOPATHIC BUILDING, COOK COUNTY HOSPITAL, CHICAGO, ILL. TYPICAL FLOOR PLAN.

Richard E. Schmidt, Garden & Martin, Architects.



Courtesy, *The Modern Hospital*

FIG. 228. PSYCHOPATHIC BUILDING, COOK COUNTY HOSPITAL, CHICAGO, ILL. HYDROTHERAPEUTIC DEPARTMENT ON TOP FLOOR.

Richard E. Schmidt, Garden & Martin, Architects.

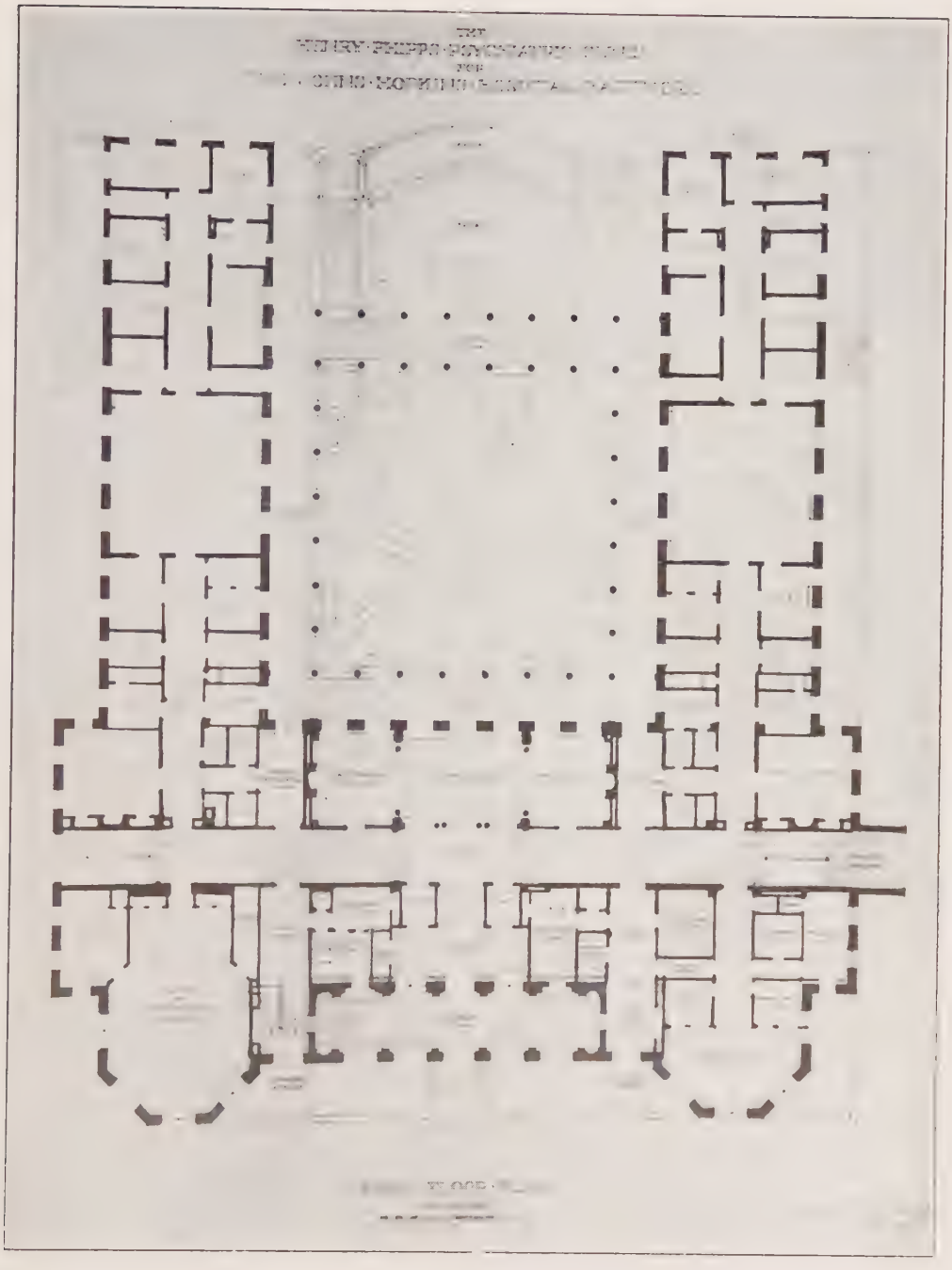


FIG. 229. FIRST FLOOR—HENRY PHIPPS PSYCHIATRIC CLINIC, JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

Grosvenor Atterbury, Architect.

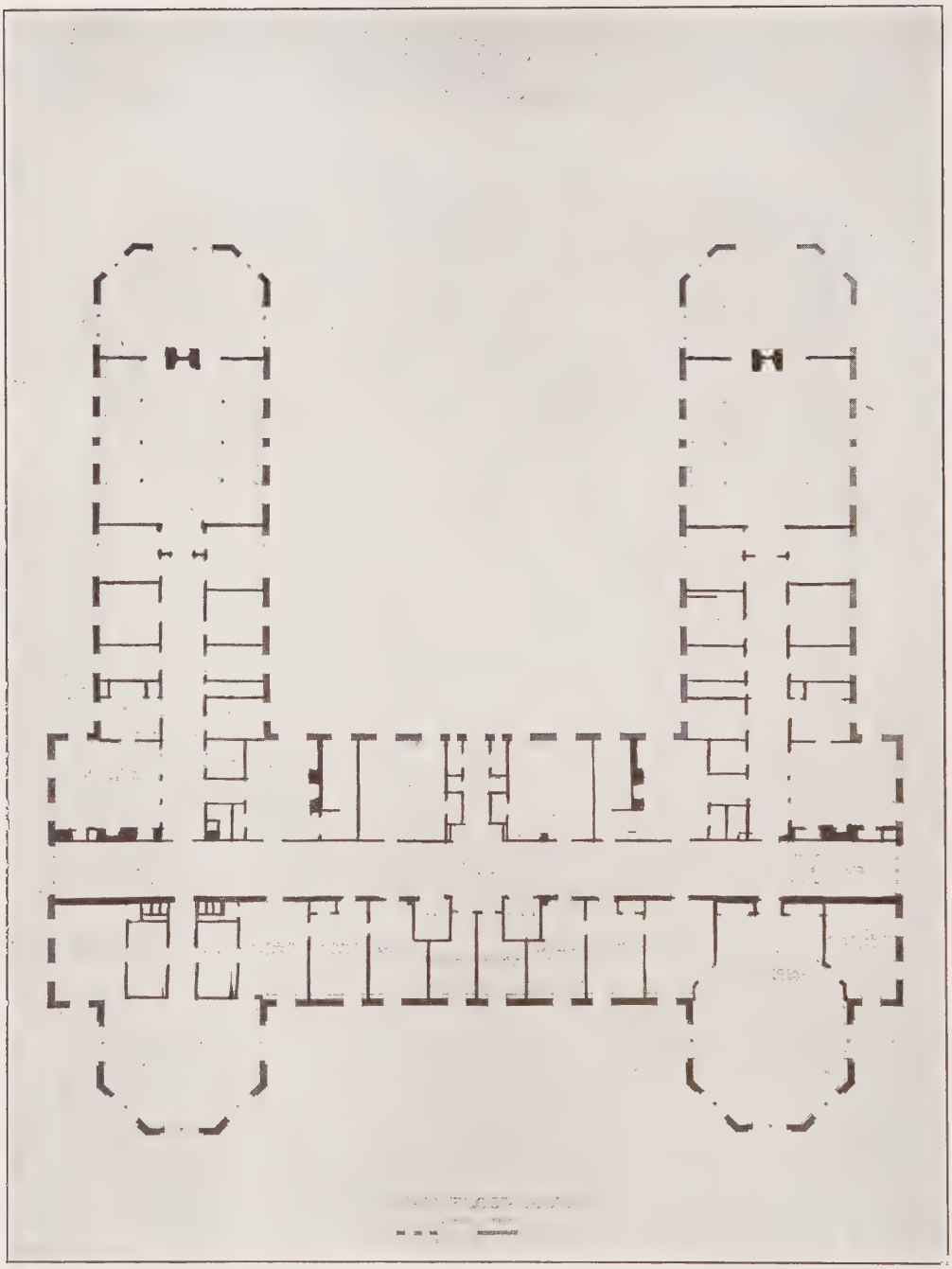


FIG. 230. THIRD FLOOR—HENRY PHIPPS PSYCHIATRIC CLINIC, JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

Grosvenor Atterbury, Architect.

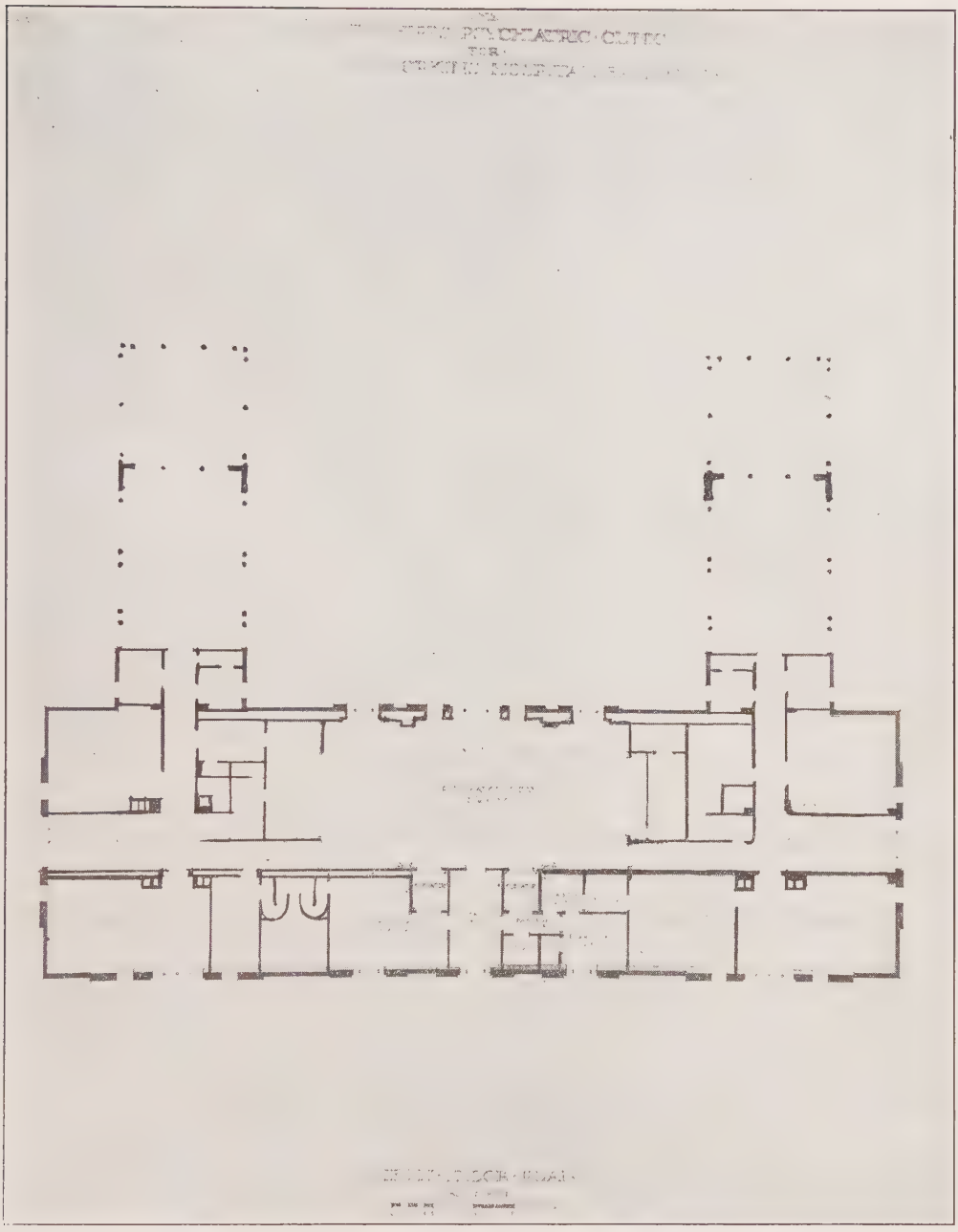


FIG. 231. FIFTH FLOOR—HENRY PHIPPS PSYCHIATRIC CLINIC, JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.

Grosvenor Atterbury, Architect.

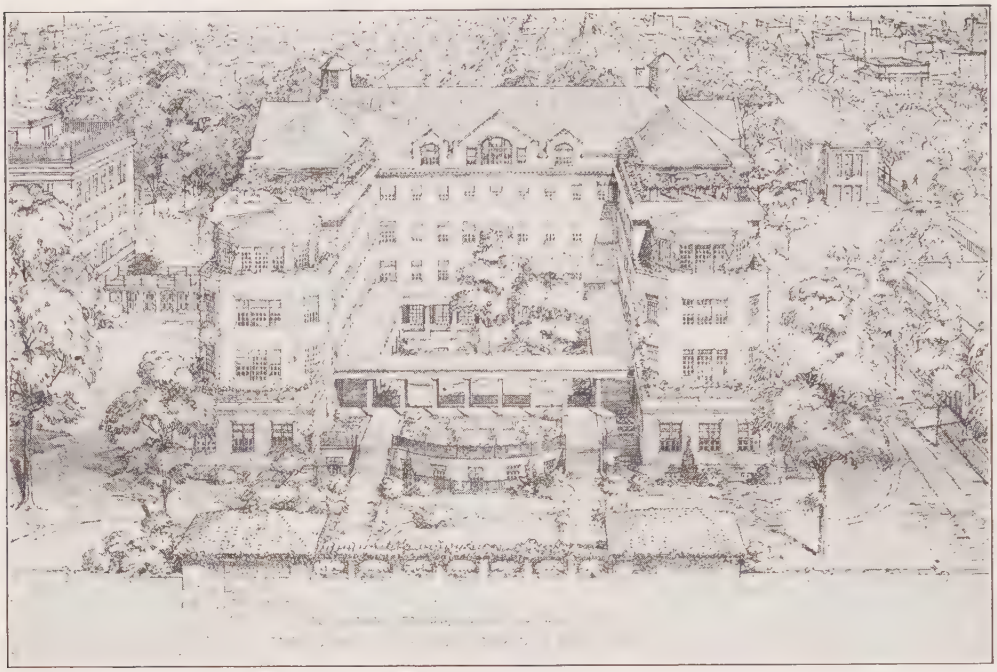


FIG. 231A. HENRY PHIPPS PSYCHIATRIC CLINIC, JOHNS HOPKINS HOSPITAL, BALTIMORE, MD.
Grosvenor Atterbury, Architect.

with this section are the operating and emergency department and the offices for the admitting officers. The remainder of the first floor is occupied by offices and quarters of administration, matron, and staff, and the general receiving department, containing waiting-room, examining room, rooms for social service workers, etc.

What might be termed the patients' building is separated from the main building by a short connecting corridor containing the elevator and staircase. The wards for the men are placed on the second floor and those for the women on the third floor (Fig. 224). Each has a section for disturbed cases, divided into separate rooms for each patient.

As in the foreign hospitals previously described, the continuous bath is used largely in the treatments.

Each ward unit has its own serving kitchen, and bath and toilet unit.

A large out-door day-room on the roof (Fig. 225) affords opportunity for exercise and recreation, and as this institution overlooks the splendid park system of the city the patients have much outside of themselves to occupy their minds.

The *Phipps Clinic,* a well-studied psychopathic department of the Johns Hopkins Hospital, shows much care and thought, not only in the planning but in the æsthetic side of hospital architecture. The restricted area made it necessary for the architect to carry the building five stories above the basement in order to provide for the needs of the department. For description, the writer is indebted to Adolph Meyer, M.D.* (Figs. 229-231A).

There is an out-patients' department, with waiting room, which also is used in part for occupation classes, social workers, and examining rooms.

In the hospital division there is an admission ward, with provision for excited cases, as well as a semi-quiet ward, a

* "The Modern Hospital," Vol. I, No. 2.

quiet ward, and a private quiet ward. A number of well-arranged, exclusively private suites and rooms are provided.

The administrative portion is principally on the north, consisting of offices for administration, laboratory and staff quarters.

The medical treatment department consists of hypdotherapy and mechanotherapy.

The top floor is reserved for the large recreation hall and roof gardens, charmingly designed and colored.

The ward unit consists of an eight-bed ward.

The *psychopathic* building of the *Cook County Hospital,* Chicago, Ill., (Figs. 226-228) is well planned. The general scheme is not unlike that of the Boston Psychopathic.

The psychiatric wards of the *army hospitals* used by the United States during the war (Fig. 12 Appendix) are designed to accommodate twenty-eight patients, in single rooms and in wards of three or four beds. Day rooms communicate almost directly with wards and rooms. Each day room has a balcony, not connected with any other. Perhaps the best feature of the plan is that one can pass from one section to another without going through other rooms.

CHAPTER X.

The Tuberculosis Department

The care of patients afflicted with pulmonary tuberculosis demands special study for the problem is totally different, from almost every point of view, from that of the treatment of the general patient, whether surgical, medical, or contagious, in the number of gradations of patients and the different care required for each grade.

If we are to plan for the care of tuberculous patients on the grounds of the general hospital, then a portion of the site should be selected remote from the other patients' buildings, but with equal regard to sunlight and protection from the cold winds. If, as is more likely to be the case, the tuberculosis hospital or sanatorium is to be isolated and an institution by itself, and a site is selected remote from water, sewerage, and other municipal service, then the problems are increased many fold, and the natural contour, the nature of the land, and the meteorological conditions must be carefully studied.

If planning for "all comers," it will be necessary to plan on about fifty per cent of the patients being of the ambulatory class, who are able to be up and about and to do light work. Plans must be made for ground room for exercise and recreation, buildings for light industrial work, buildings for dining and entertainment rooms, facilities in other wards for carrying on the various activities of life under hygienic and supervised conditions, the main aim being to have the maximum amount of sunshine, fresh air, and absolute ventilation.

The area of land must not be restricted and it should have level stretches about the buildings. The outlook and general environment are almost as important as sunlight and ventilation—e. g., an otherwise beautiful site might lose much of the therapeutic value if a cemetery were in the immediate foreground, or if situated near noisy manufacturing plants or smoking chimneys.

The average incipient patient soon wearies of his enforced confinement; and unless the natural attractions are considered he becomes discontented and leaves, so that the sanatorium may be without patients.

In providing service for tuberculosis cases they may be roughly divided into three general groups:

1st—Those in the last stages, in many instances dying patients;

2nd—The acute but recoverable cases, who are in accordance with present methods, kept in bed until their temperature subsides.

3rd—The ambulatory cases, with incipient or even moderately advanced cases, incapable of regular work yet enjoying a reasonable degree of health;

4th—The out-patient who, while needing treatment through the day, may return to his home at night under proper supervision.

For the treatment of the first class, wards or private rooms not unlike other medical wards or private rooms should be provided.

Proper care must be exercised for the

FIG. 232. REVOLVING AIRING BALCONY, AMSTERDAM HOSPITAL, AMSTERDAM HOLLAND.

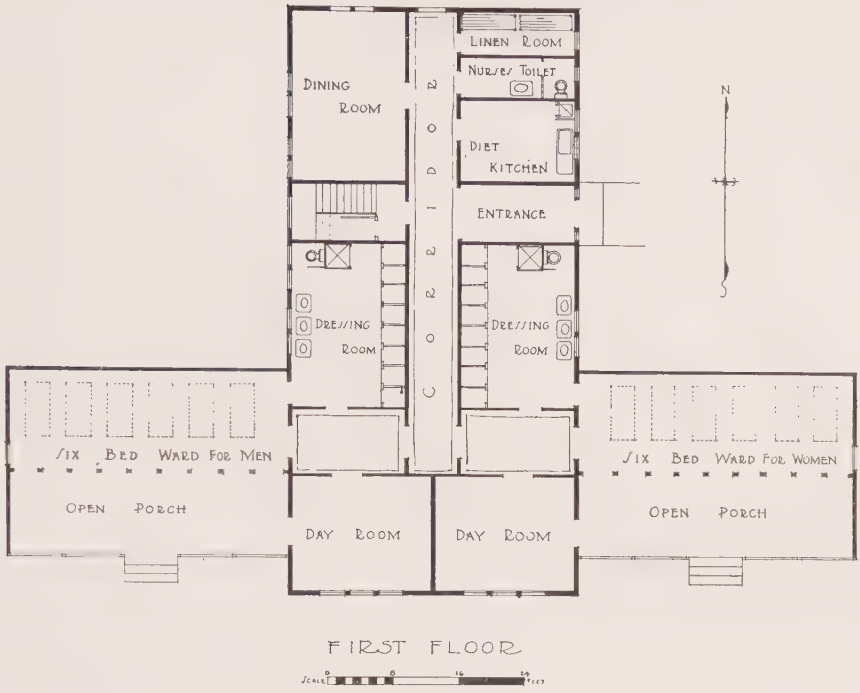


FIG. 233. PROPOSED TUBERCULOSIS UNIT, CITY OF JACKSONVILLE, FLA.

protection of the nurse and the prevention of the spread of disease.

For the comfort of the patients the wards should not be too large; if subdivided by permanent screens they may become less depressing. Everything possible should be done to brighten the ward, and there should be provided a wealth of sunshine and plenty of out-of-door balconies.

As the death rate in these wards will naturally be greater than in any other part of the institution, the method of removing the body from the building so as to attract the least attention should be studied. If the morgue can be at some little distance from the wards, with an underground connection, much mental suffering will be avoided.

The acute cases should be in outdoor wards or in rooms well open to the air, much as the ambulatory cases are. Nursing facilities must be provided for them, however, practically the same as those for the third-stage cases, since in many institutions these patients are not allowed to get out of bed.

For the ambulatory case the problem is very different. Here there are patients who are up and dressed, and active to a certain degree, but for whom there must be provided proper sleeping quarters, with due regard to the out-of-door treatment recommended for this class. There must also be dressing and bath rooms which can be warmed in cold weather, recreation rooms for stormy weather, recreation parks for pleasant weather, and light employment for certain hours. Every ambulatory patient should have a cupboard, locker, or closet, which will be large enough to be entered and to contain his personal belongings. This cupboard should be well lighted, well ventilated, and well heated; for to the lonely man away from family and friends this may be the only place which he may call his very own. Such a cupboard should not be less than three by four feet in size, and should contain a seat, shelves, mirror,

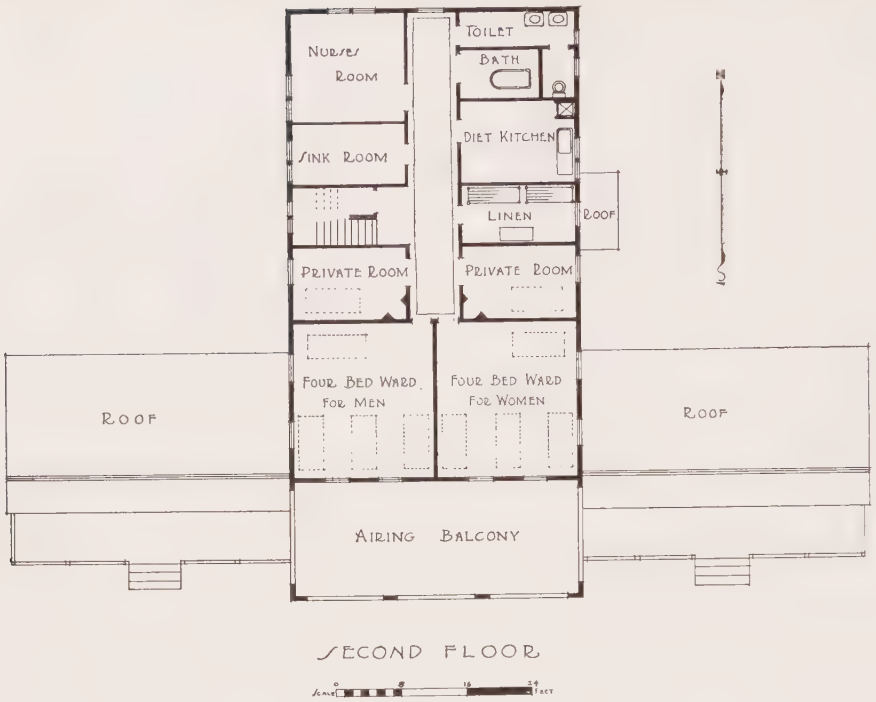


FIG. 234. PROPOSED TUBERCULOSIS UNIT, CITY OF JACKSONVILLE, FLA.

and any other conveniences which experience may dictate.

The toilets should be of sufficient size to accommodate the patients of the particular unit which they serve, and should be reasonably near the sleeping quarters.

The general room or day room should be light and cheerful, as it is the living-room of the family or the unit which it serves.

The sleeping quarters can be in wards, with beds on either side, with plenty of windows to open, or of the "tent" or "shack" form, open toward the south, with beds to the north. The modification of the shack has become perhaps the most popular form for the housing of incipients, for with this type the bed of the patient can be brought practically into the open when desired. The south can be closed with swinging sash or cloth screens, or can be left entirely open.

Scopes and Feustmann, architects, New York, call attention to the fact that cheapness of shack construction has often led committees to neglect to provide the necessary comforts. In nearly all places some provision must be made for cold weather, and for severe storms. In county tuberculosis sanitaria there is sure to be a considerable number of acute and advanced cases, who require nursing and some degree of comfort, and who cannot be properly cared for in shacks. (*)

Nearly every tuberculosis hospital or sanatorium has its *out-patient* clinic, where the patient spends the day on the sunny lawn or broad terraces, receiving nourishing food and good advice for home living. For this work the principal equipment is steamer chairs, blankets, serving kitchens, and intelligent attendants. This educational and helpful work, followed up as it is by the social service work of the institutions, is accomplishing important results in the stamping out of the great white plague. The *Boston Consumptives' Hospital,* Mattapan, Mass., is one of the institutions which does an extensive out-patient work.

* "The County Tuberculosis Sanitarium," in the Architectural Forum, June, 1919.

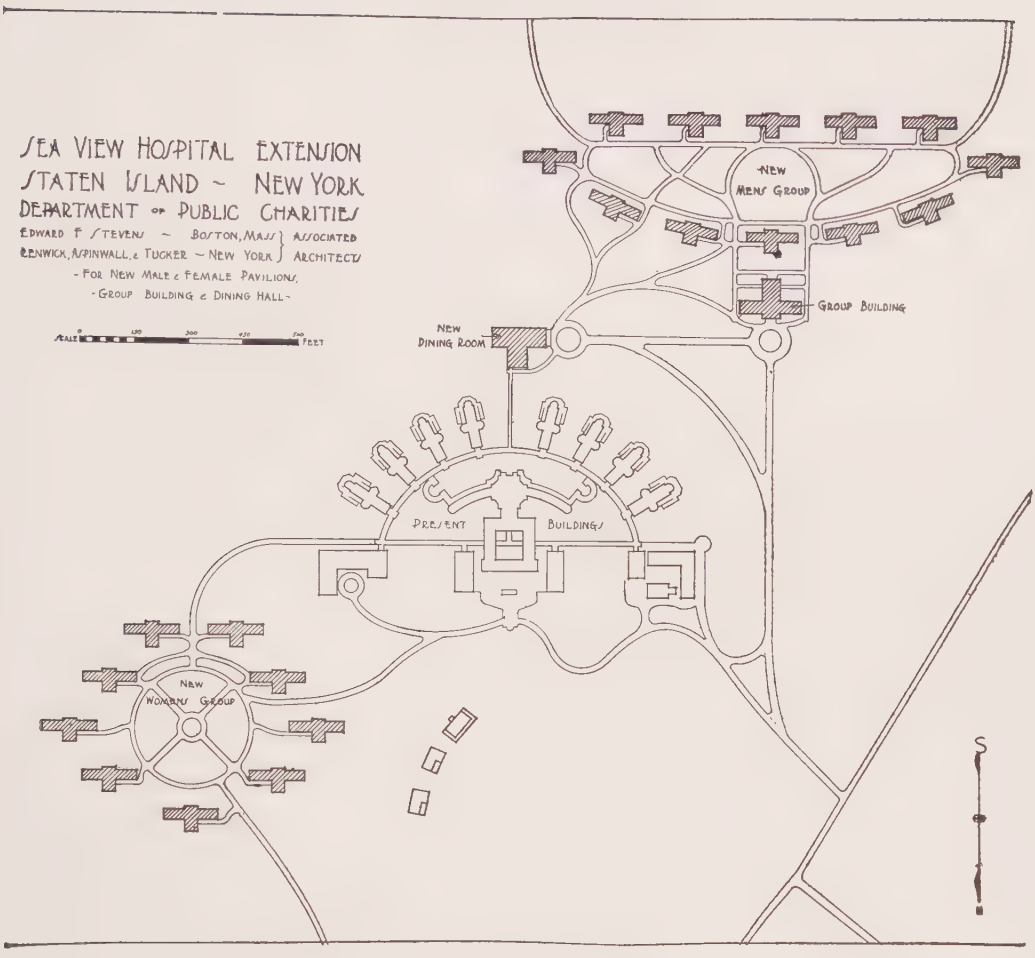

SEA VIEW HOSPITAL EXTENSION
STATEN ISLAND ~ NEW YORK
DEPARTMENT OF PUBLIC CHARITIES
EDWARD F STEVENS ~ BOSTON, MASS } ASSOCIATED
RENWICK, ASPINWALL, & TUCKER ~ NEW YORK } ARCHITECTS
- FOR NEW MALE & FEMALE PAVILIONS,
- GROUP BUILDING & DINING HALL -
SCALE 150 300 450 600 FEET
NEW MENS GROUP
GROUP BUILDING
NEW DINING ROOM
PRESENT BUILDING
NEW WOMENS GROUP
S

FIG. 235. PLOT PLAN.

In the large city and county institutions the industrial work of the institution can be done largely by the patients, with a tailor shop for the mending of patients' clothing, a harness shop for all leather work, carpenter shop for the necessary repairing, sewing rooms for repairing the linen and the making up of new material. Light employment during certain hours can be made a profit to the institution and a help to the patient. Waiting on tables and the light janitor work about the building can all be done by the patients. Dr. Marcus Paterson, of Frimley, England, has had remarkable results with carefully controlled occupational therapy, using such work as flower and vegetable gardening, chicken raising, etc., and extending to the care of lawn and grounds, painting, grading, etc. (*)

For the ambulatory class, dining-rooms must be provided, general assembly rooms for religious and secular services, recreation rooms, reading rooms, store and post-office, as well as general examining rooms, dental rooms, barber shops, etc.

An operating department should be provided, for the presence of tubercular germs does not prevent appendicitis or other troubles. If care in an acute hospital is easily available, the operating

* "Auto-inoculation in Pulmonary Tuberculosis," Marcus Paterson, M. D.

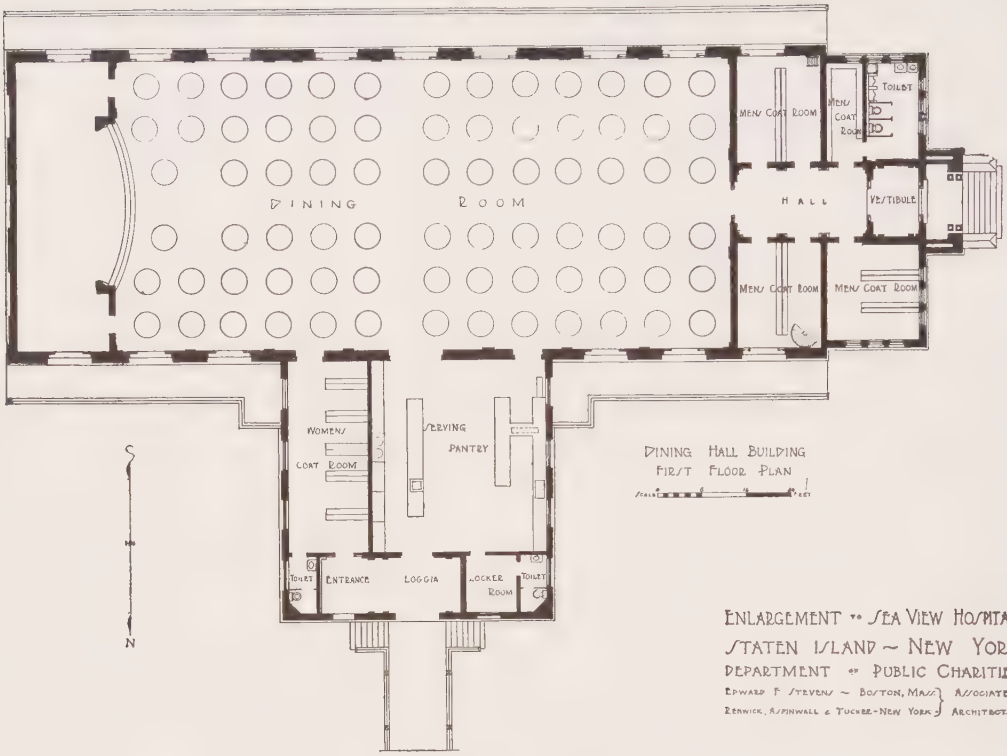


FIG. 236.

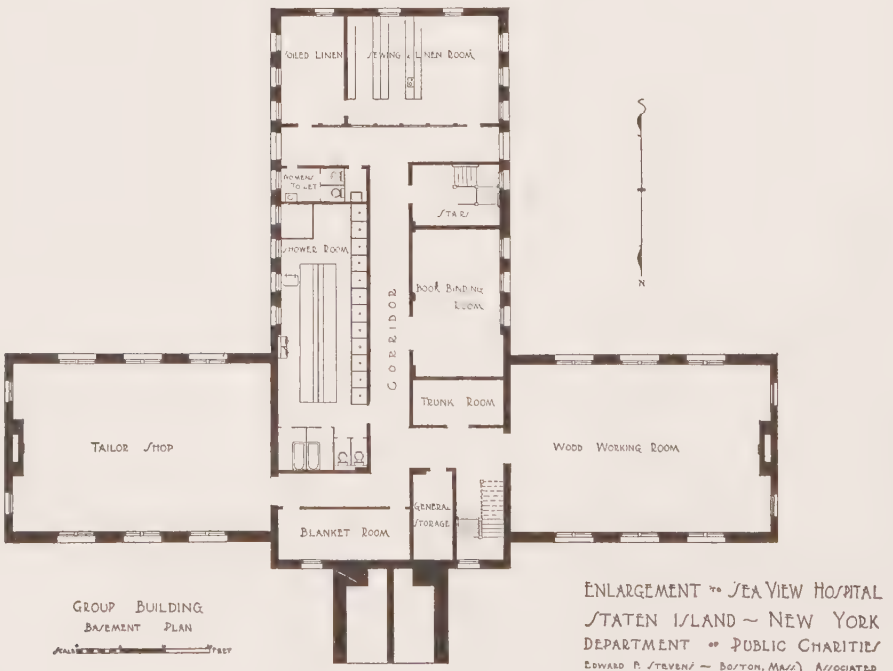


FIG. 237.

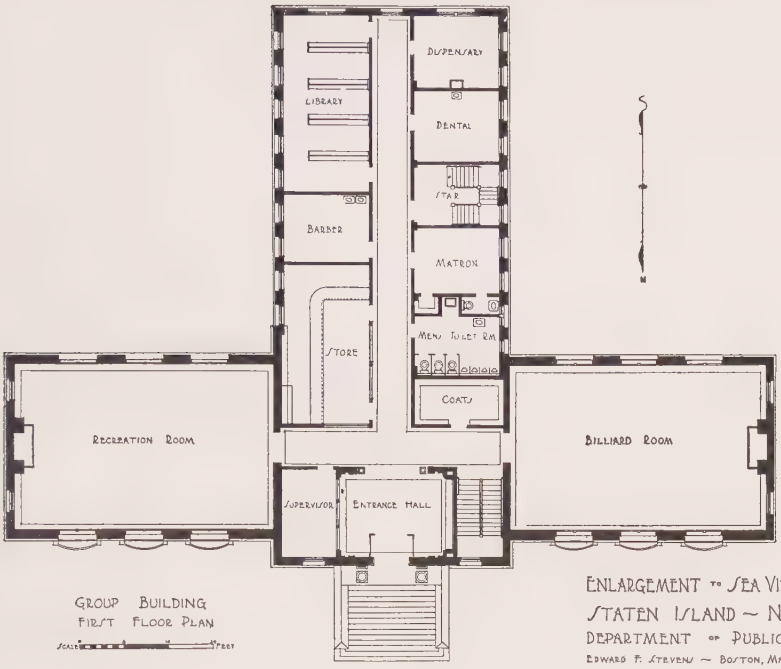


FIG. 238.

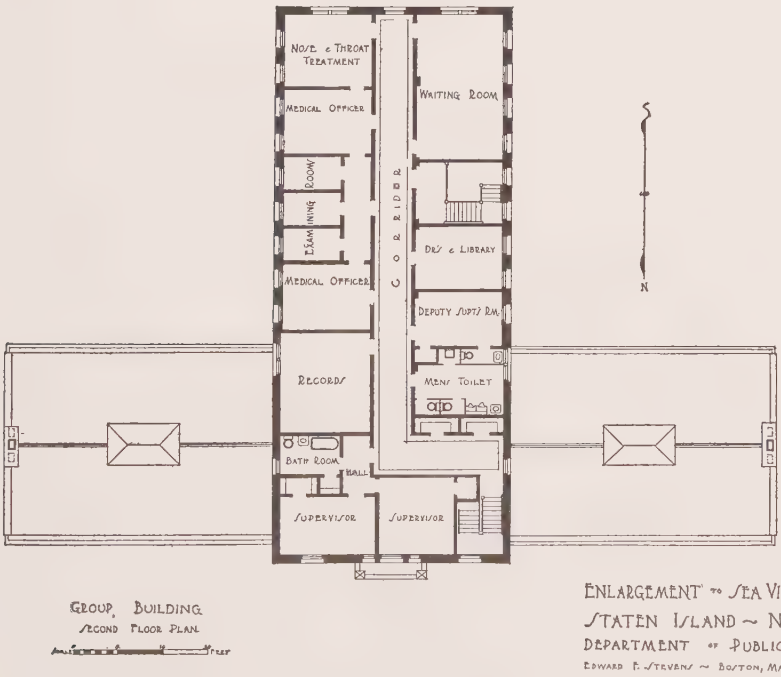


FIG. 239.

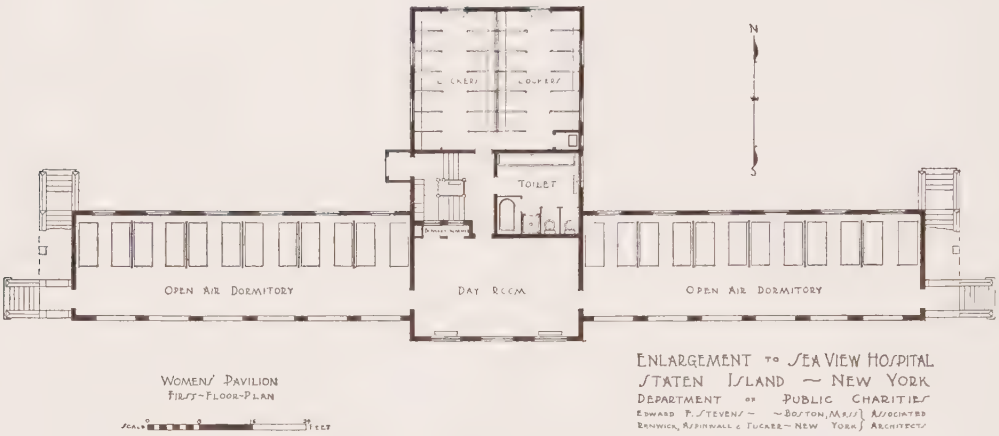


FIG. 240.

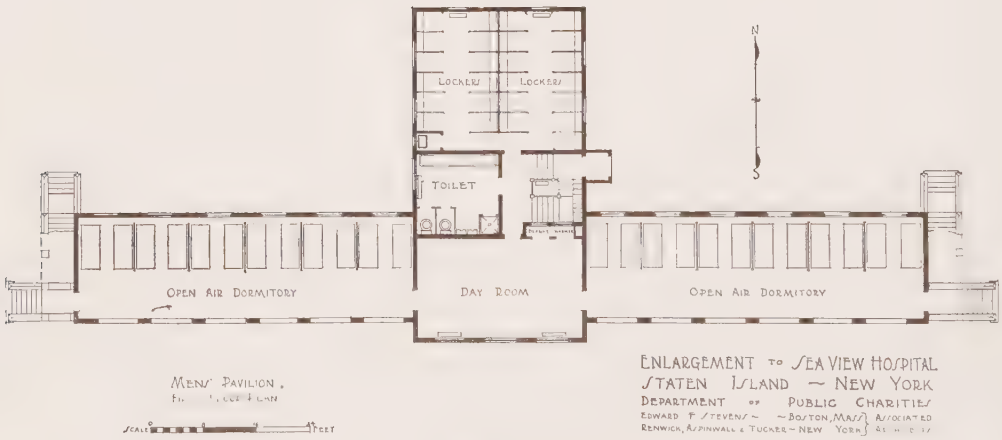


FIG. 241.

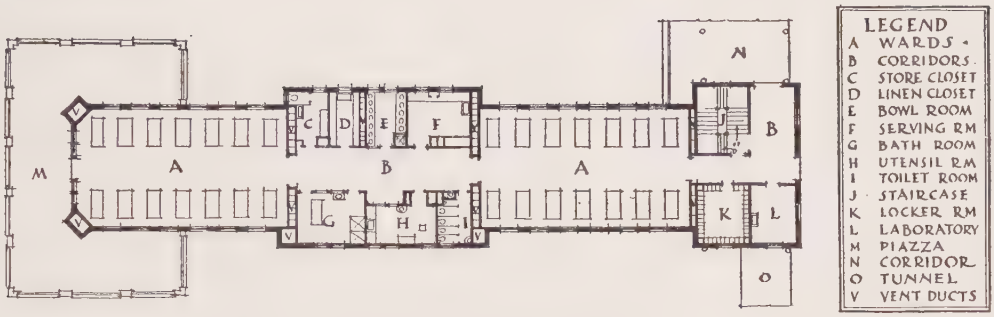


FIG. 242. BOSTON CONSUMPTIVES' HOSPITAL, WARD BUILDING
Maginnis & Walsh, Architects.

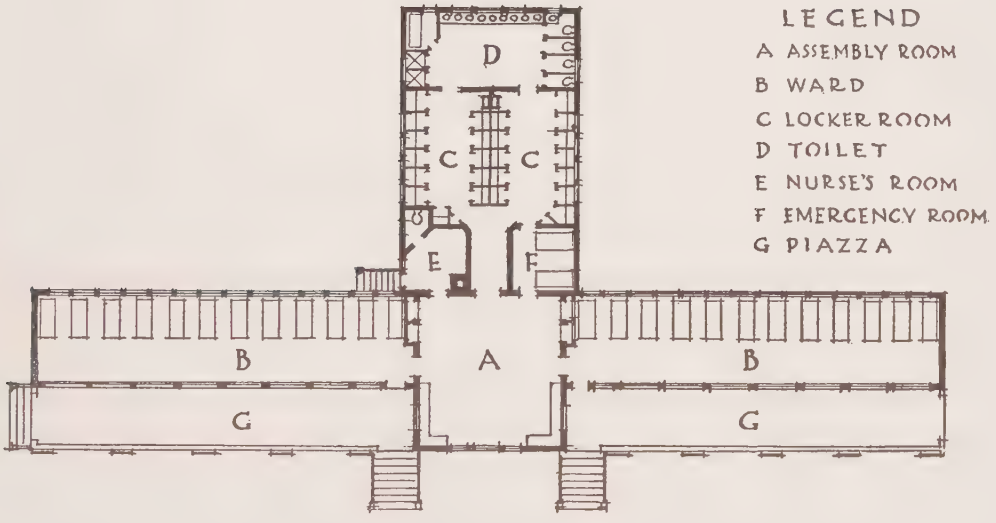


FIG. 243. BOSTON CONSUMPTIVES' HOSPITAL, COTTAGE FLOOR PLAN.
Maginnis & Walsh, Architects.

FIG. 244. CENTRAL NEW ENGLAND SANATORIUM, RUTLAND, MASS.
Edward F. Stevens, Architect.

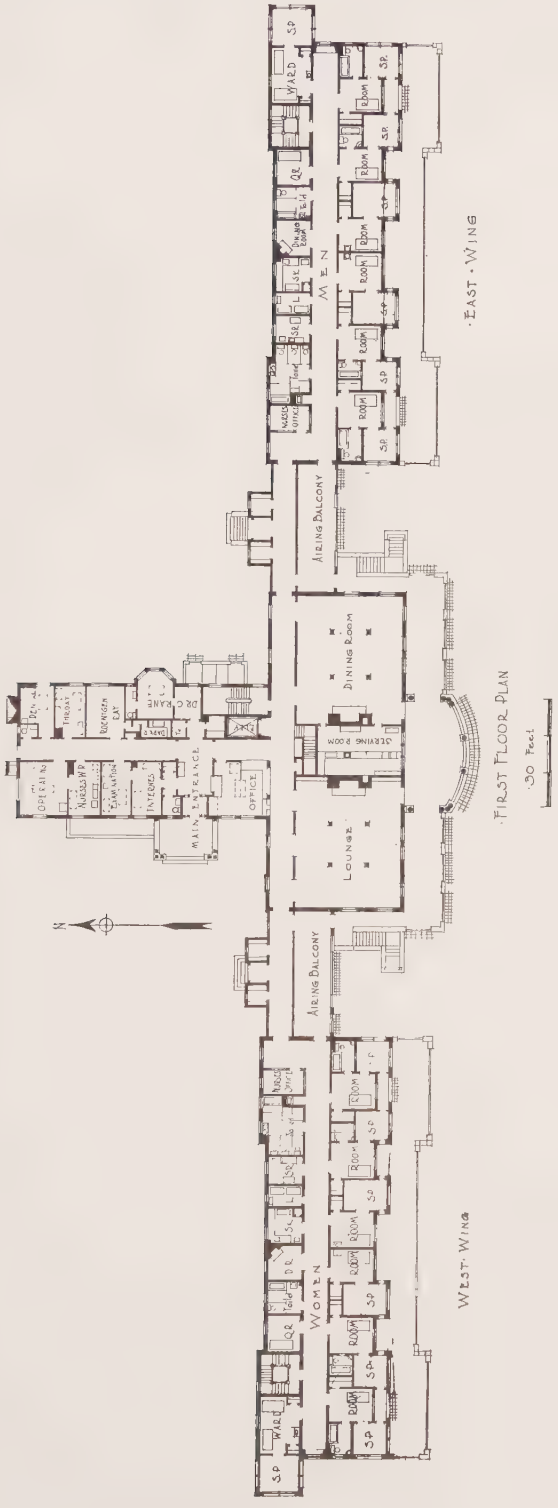


FIG. 245. CENTRAL NEW ENGLAND SANATORIUM, RUTLAND, MASS.
Edward F. Stevens, Architect.

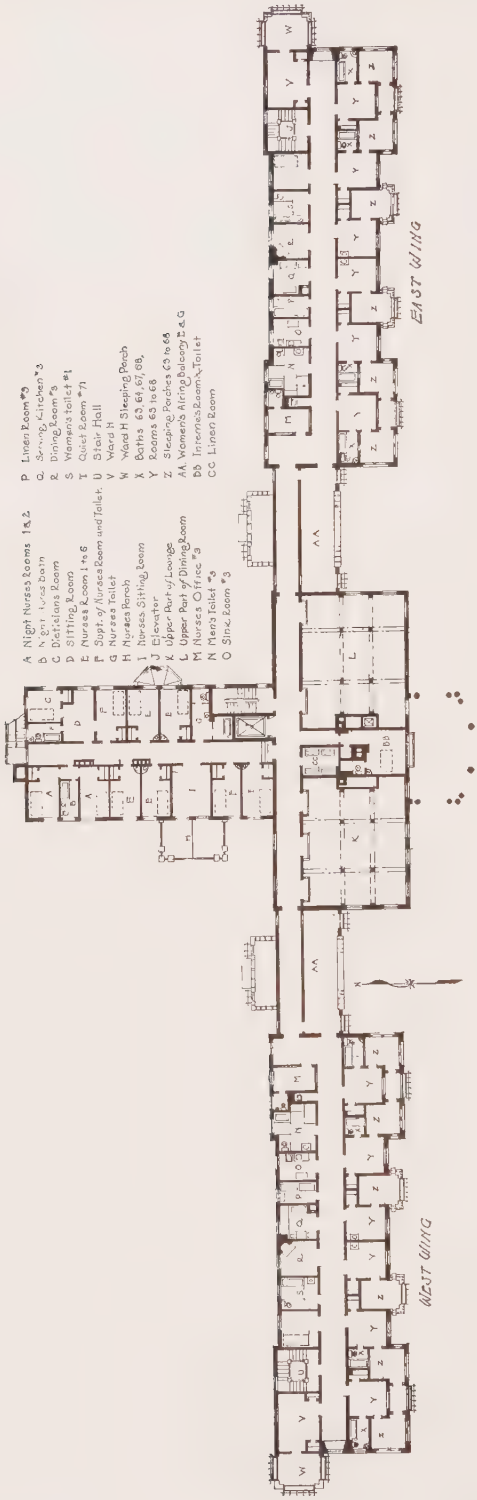

A Night Nurses Rooms 1 & 2
B Ward Nurses Room
C Dietitians Room
D Sitting Room
E Nurses Room 1 to 6
F Supt. of Nurses Room and Toilet.
G Nurses Toilet
H Nurses Porch
J Nurses Sitting Room
K Elevator
L Upper Part of Lounge
M Nurses Office #3
N Men's Toilet #3
O Sink Room #3
P Linen Room #3
Q Serving Kitchen #3
R Dining Room #3
S Women's Toilet #1
T Toilet Room #1
U Stair Hall
V Stair Hall
W Ward H Sleeping Porch
X Baths 63, 64, 67, 68,
Y Rooms 63 to 68
Z Sleeping Porches 63 to 68
AA Women's Hiring Balcony 1 & 3
BB Internes Room & Toilet
CC Linen Room
EAST WING
WEST WING
SECOND FLOOR PLAN
Scale

FIG. 246. CENTRAL NEW ENGLAND SANATORIUM, RUTLAND, MASS.
Edward F. Stevens, Architect.

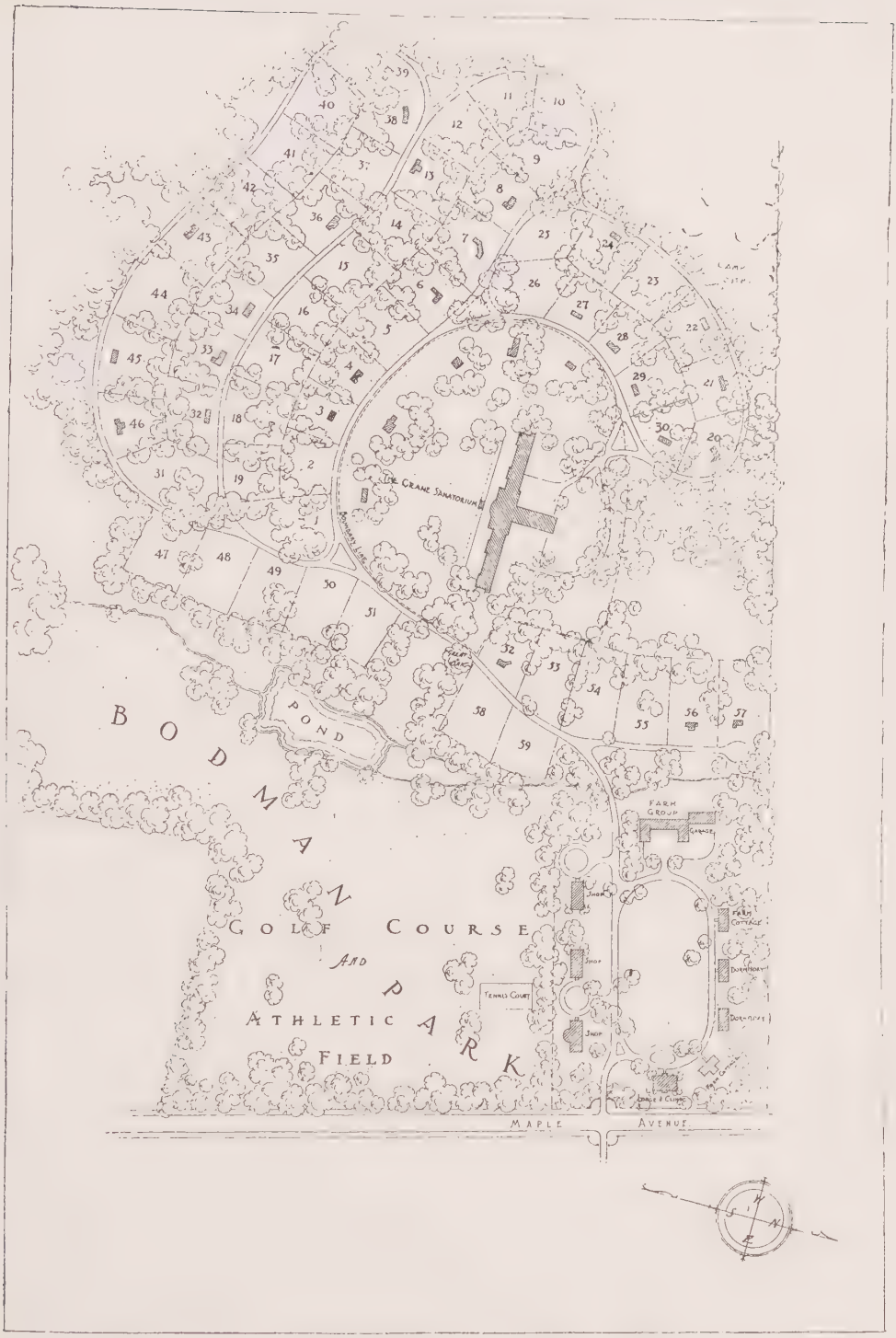


FIG. 247. PLOT PLAN—CENTRAL NEW ENGLAND SANATORIUM, RUTLAND, MASS.
Edward F. Stevens, Architect. Arthur A. Shurtleff, Landscape Architect.

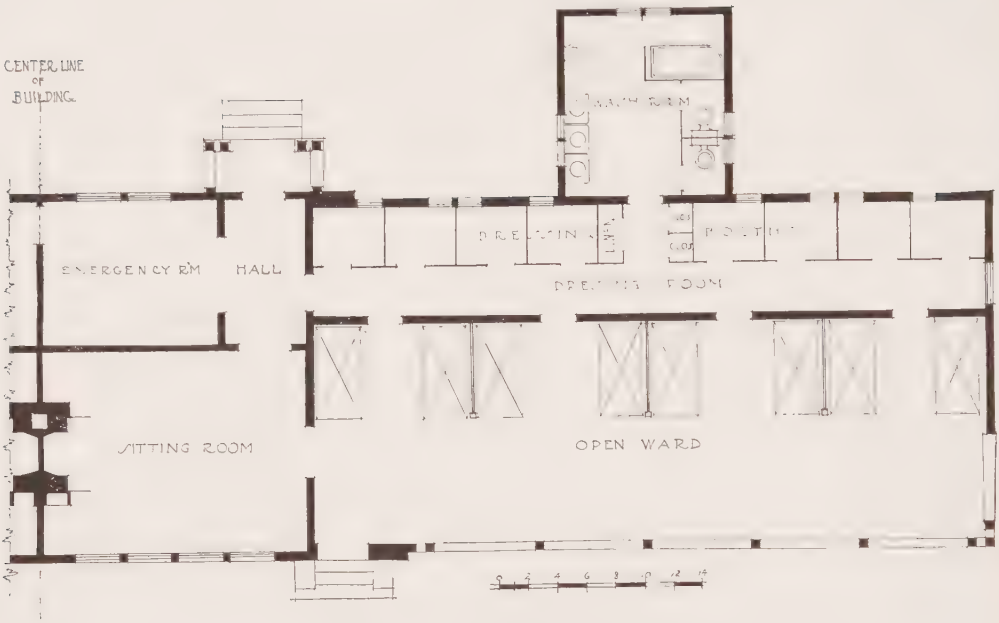


FIG. 248. PAVILION—NOVA SCOTIA SANATORIUM, KENTVILLE, N. S.
Scopes & Feustmann, Architects.

room will probably not be used, and may be omitted. There should be, however, a room equipped for doing surgical dressings.

One item peculiar to the care of tuberculosis is the provision for the destruction of sputum cups, gauze and dressings which have come in contact with the patient. This can be a separate building where the patient can deliver his sputum cup and receive a fresh one, and where there is a suitable incinerator for the absolute destruction of all waste material.

Open air day shacks or shelters can be provided through the grounds at little extra expense. There are numerous patterns and they may even be made revolving, like the one photographed by the writer in Amsterdam, Holland (Fig. 232), where the pavilion could be turned to shield the patient from sun or wind.

Of the many good examples of tuberculosis hospitals and sanatoriums, few will be here shown, as this subject has been so carefully taken up by Dr. Thomas S. Carrington in his work on "Tuberculosis Hospital and Sanatorium Construction,"* to whom the writer is indebted for many helpful suggestions in his own practice.

A simple solution of the tuberculosis ward for the general hospital which was designed for the Health Board of the City of Jacksonville, is here shown (Figs. 233, 234). This unit provides for a limited

* Published by National Association for the Study and Prevention of Tuberculosis, 105 E. 22nd St., New York.

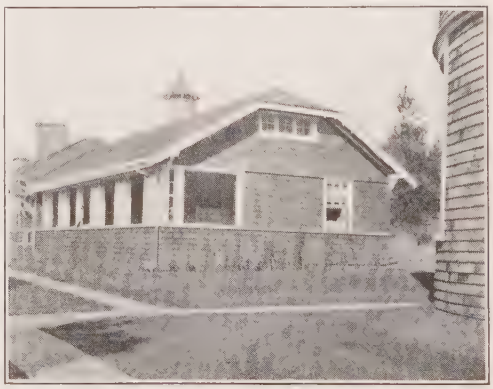


FIG. 249. PAVILION—NOVA SCOTIA SANATORIUM, KENTVILLE, N. S.
Scopes & Feustmann, Architects.

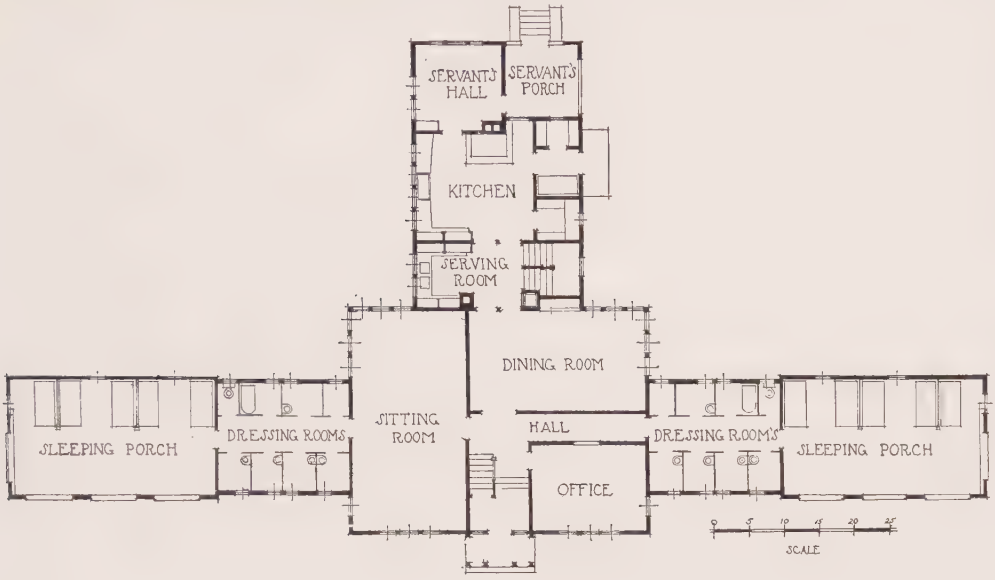


FIG. 250. PAVILION—LOOMIS SANATORIUM, LOOMIS, N. Y.
Scopes & Feustmann, Architects.

number of both chronic and incipient cases, the administration, food, and laundry being taken care of in another building. This unit is a part of the contagious department under the charge of the city.

The City of New York, through its Department of Health, has established at Otisville, at an altitude of from eleven hundred to twelve hundred feet in the Shawangunk Mountains, a most complete sanatorium for the care of tuberculosis.

Various types of construction and units were built from a single bed tent house to the more pretentious fireproof building; but in practically every building the sleeping is out-of-doors. Dressing-rooms and day-room are provided, which are heated certain hours in the day.

The Department of Charities also provides in its hospital work for the care of tuberculosis, both in the general hospitals on Blackwells Island and in the *Sea View Hospital* on Staten Island. In the latter institution (Fig. 235) which, with the additions now being built, will provide for two thousand patients, the earlier group occupied in 1914 will be used to house the chronic or bed patients. The ambulatory patients will occupy the twenty-one new pavilions. The institution will then be well balanced, accommodating an equal number of bed and ambulatory cases. The new out-door pavilions are built in two groups, the one at the southwest to accommodate six hundred men, with "group" or executive building, and the other at the northeast to accommodate four hundred women. Dining facilities for the men will be afforded by the new dining hall placed on the main axis of the original group, and served by the main kitchen. This building (Fig. 236) also is used for an entertainment and assembly hall for patients of both sexes. The women will be served in the present dining building.

While the administration of the entire group will be from the main administration building, the "group" building in the center of the male section will contain the offices of the medical examiner and matron. There are examining rooms, pharmacy and treatment rooms, baths for men, store, barber shop, dental treatment room, recreation rooms and library, as well as work rooms for various industries, and a linen room where all linen for the group will be given out.

FIG. 251. THE OLIVIA COTTAGE—LOOMIS SANATORIUM, LOOMIS, N. Y.
Scopes & Feustmann, Architects.

The pavilion buildings, twenty-one in number, are practically identical (Figs. 240 and 241). They are two stories in height, of fireproof material, divided into four sleeping apartments of twelve beds each, with each unit of two beds separated from the others by a dividing screen six feet high, but open on end and underneath to permit air circulation. These are not heated and are open to the south, with possible closing by the use of cloth screens on frames hinged at the top.

For each two wards a day room is provided, connecting directly with the toilet section, beyond which is the locker room. Each patient is provided with a locker three by four feet, with short door and screen ceiling, allowing free circulation of air but preventing interference from outside.

Two of the units used at the *Boston Consumptives' Hospital* at Mattapan will serve to illustrate the various units for different treatment of chronic and incipient cases. The ward building (Fig. 242) here shown is two stories in height. Each unit is divided in the center, and the main service rooms are placed between the two fourteen-bed wards. Ample airing balcony space is provided, and the unit has proved easy of administration. For the more active patients the one-story pavilions (Fig. 243) are used. This unit is similar to those used in other State and City hospitals, and has been fully described and classified by Dr. Carrington.* Larger locker space is provided for the patients, additional airing balcony for each bed, an emergency room, and a room for the nurse, as well as a

* Published by National Association for the Study and Prevention of Tuberculosis, 105 E. 22nd St., New York.

large day room accessible to each division. The building is of wood, in simple, picturesque style. There are throughout the country private sanitoria for the care of tuberculous patients who can afford to pay for a greater degree of comfort. The *Central New England Sanitorium,* Rutland, Mass., will serve to illustrate this type of institution.

Built upon a beautiful southern slope, this group of buildings will when complete house about eighty patients. The main building, facing south, consists of three sections, separated by fireproof balconies. The center section contains: on the ground floor (Fig. 244) the kitchen, laundry and heating plant; on the first floor (Fig. 245) the offices, examining and treatment rooms, the lounge, and the patients' dining room; on the second floor (Fig. 246) the superintendent's suite and guest rooms are at the front, rooms for patients' friends, etc., at the rear. The main lounge and the dining room extend through two stories, and are beautified with large fireplaces.

The three floors of the east and west wings, which house the patients, are planned to provide for varying degrees of luxury. There are single rooms, two-bed wards and private suites, all with ample outdoor balconies. The utility rooms are on the north side. The connecting airing balconies provide additional outdoor space, and make a fireproof cut-off between the three sections. The exterior is in Mission style. The construction is of hollow tile, with rough plaster finish.

The plot plan (Fig. 247) indicates the broad view of the founder of this institution. There will be grouped about the main building the industrial and physical training buildings, and a considerable colony of small houses and shacks.

At the *Nova Scotia Sanitorium,* Kentville, N. S. (Figs. 248, 249), there are two types of buildings. The one for ambulatory patients is self-contained, having open verandas which may be closed in storms or severe weather, dressing rooms, a sitting room with wide windows, and an emergency room.

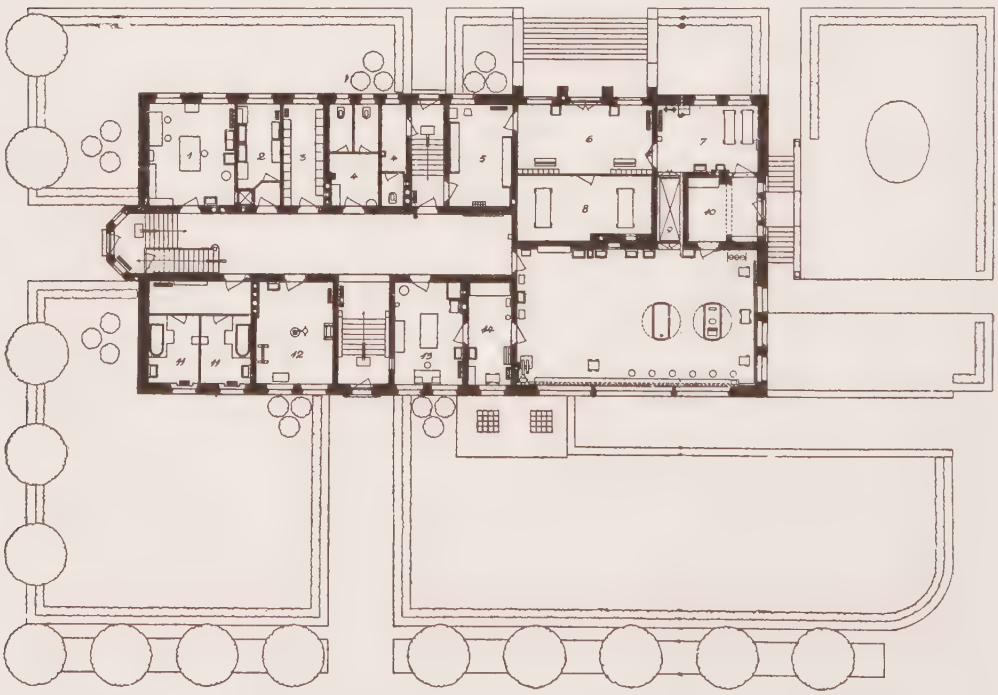
The *Olivia Cottage,* at the Loomis Sanitorium, Loomis, N. Y. (Fig. 251), provides an enclosed portion for sick patients, utilities or for severe weather. For ambulatory cases in good weather the porches are wide-open and airy.

CHAPTER XI.

The Laboratories

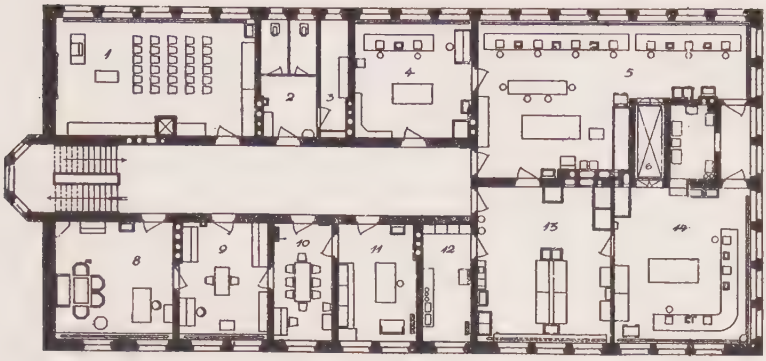
The development of the *laboratory work* in the general hospital depends largely on the personnel of the staff, the proximity to establish independent laboratories, and the possibility of the development within the institution. In the larger hospitals, separate buildings away from the main group are devoted entirely to laboratory purposes, where there are class rooms for teaching, autopsy rooms and morgue; and often the chapel is connected with this building. These, with the local laboratories in the ward units and the operating units, form a chain for diagnostic and research work, which is every year becoming more and more essential. Facilities and equipment which ten years ago were considered elaborate are now thought bare necessities.

In the small hospital, however, of fifty beds or less, where the laboratory work is done by members of the staff, it is not necessary to provide extensively. Light basement rooms will generally serve for the purpose, the principal necessity being light. There must be space and equipment for making blood tests, urinalyses, examinations of pus, sputum and other bacteriological work; and every hospital will have its own particular addition to the list. In planning laboratories at the present time, it should be kept in mind that enlargement is almost sure to be needed.



1. Utility Room. 2. Dark Room. 3. Clothing Locker Room. 4. Waterclosets. 5. Mourners' Waiting Room. 6. Ante Room. 7. Undertaker's Room. 8. Body Display or Identification Room. 9. Freight Lift. 10. Hall. 11. Bath Rooms. 12. Roentgen Ray Rooms. 13. Assistant's Room. 14. Entry. 15. Dissecting Room.

FIG. 252. MUNICH-SCHWABING HOSPITAL, MUNICH, GERMANY. PATHOLOGICAL BUILDING. FIRST FLOOR PLAN.



1. Museum and Lecture Room. 2. Watercloset. 3. Store Room. 4. Laboratory of the Prosector. 5. Histological Laboratory. 6. Lift. 7. Incubator Room. 8. Prosector's Room. 9. Library. 10. Reading Room. 11. Supply and Instrument Room. 12. Scale or Balance Room. 13. Chemical Laboratory. 14. Bacteriological Laboratory.

FIG. 253. MUNICH-SCHWABING HOSPITAL, MUNICH GERMANY. PATHOLOGICAL BUILDING. SECOND FLOOR PLAN.

FIG. 254. MUNICH-SCHWABING HOSPITAL, MUNICH, GERMANY. DISSECTING ROOM.

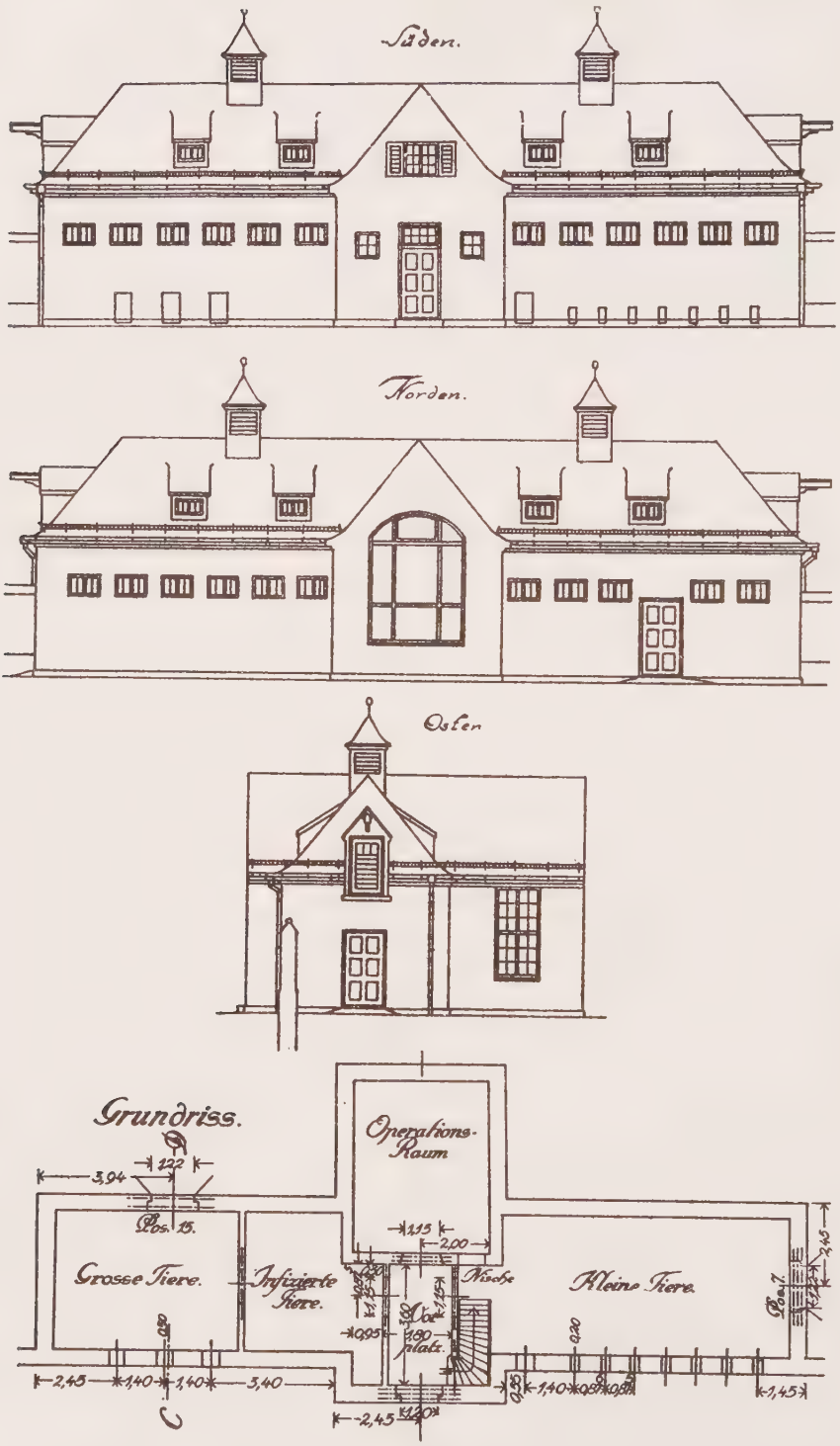
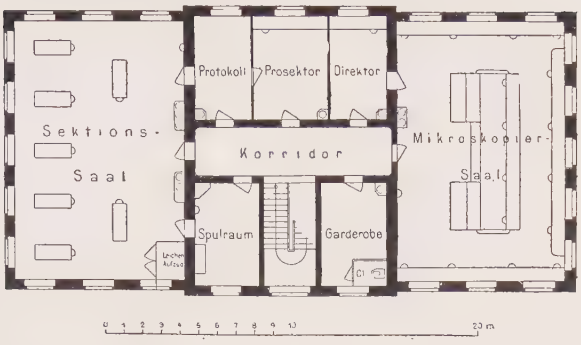
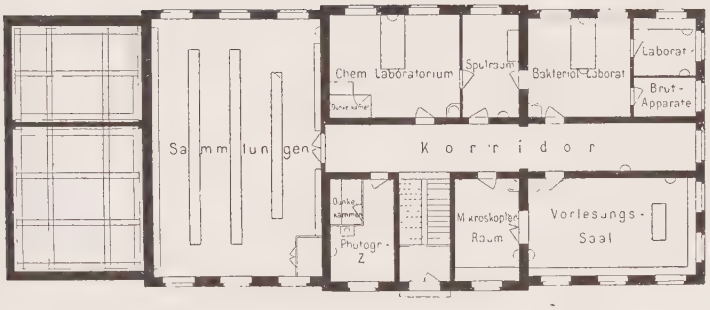


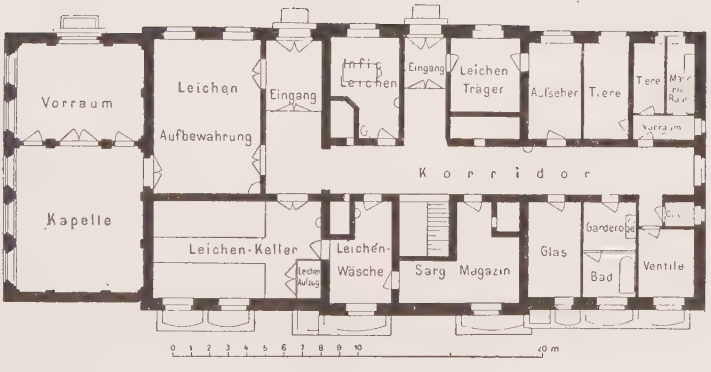
FIG. 255. MUNICH-SCHWABING HOSPITAL, MUNICH, GERMANY. PATHOLOGICAL DEPARTMENT. ANIMAL BUILDING.
Richard Schachner, Architect.



SECOND FLOOR.



FIRST FLOOR.



BASEMENT.

FIG. 256. PATHOLOGICAL BUILDING, ST. GEORG HOSPITAL, HAMBURG, GERMANY.

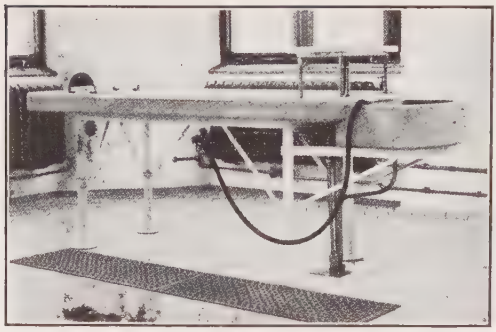


FIG. 257. DISSECTION TABLE, ST. GEORG HOSPITAL, HAMBURG, GERMANY.

For the larger research laboratories, space for the hygienic care of animals used in experimentation must be provided, either on the roof of the building or even in a separate building; but if they must be kept on lower levels, the rooms should receive special ventilation.

Every hospital, even of fifty beds or less, should have a room where autopsies can be performed, and suitable equipment for the same should be furnished. This room must be well ventilated, should have a flushing floor drain, simple autopsy table, with sink and facilities for properly handling the body. Good day lighting is desirable but not necessary; but there must be an abundance of artificial light.

In the larger hospitals in Europe, the

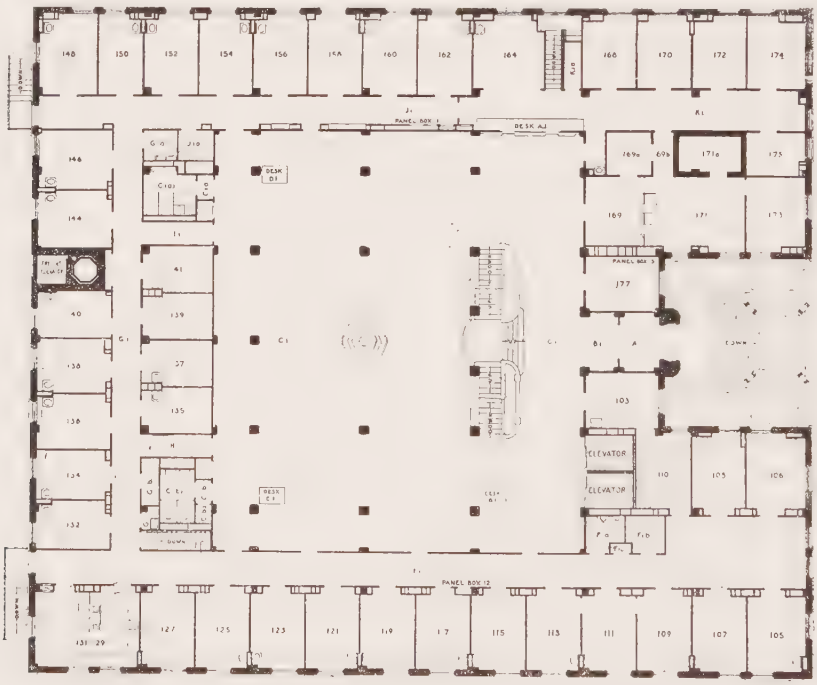


FIG. 258. MAYO CLINIC, ROCHESTER, MINN. FIRST FLOOR PLAN.
Ellerbe & Round, Architects.

Room 107
Room 105
Room 106
Room 108
Room 110
Room 103
} Consultation rooms.

Room 109 C. H. Mayo, Consultation.
Room 111 Reception, W. J. and C. H. Mayo.
Room 113 W. J. Mayo, Consultation.

Room 115
Room 117
Room 119
Room 121
} Consultation rooms.

Room 123
Room 125
Room 127
Room 132
Room 134
Room 138
Room 136
Room 140
Room 144
Room 146
} Consultation rooms.

Room 135 Clinical.
Room 137 Clinical.
Room 139 Clinical.
Room 141 Hospital assignment.
Room 164 Alphabetical index.
Room 169 Accounts.

Room 148
Room 150
Room 162
Room 154
Room 156
Room 158
Room 160
Room 152
} Consultation rooms

Room 174
Room 172
Room 170
Room 168
} Stenographers.

Room K1 Mail distribution.
Room 175 Dictaphone.
Room 173 Office.
Room 177 Office telephone central

pathological department is under separate management. The plans of the Pathological Institute of the Munich-Schwabing Hospital are here shown (Figs. 252, 253) and are self-explanatory. The detail and equipment are excellent, the dissecting room in particular (Fig. 254) showing most careful attention to plumbing and outfit. In this institution there is a separate building (Fig. 255) for animals, with special operating room perfectly equipped.

The pathological building at St. Georg is another carefully developed department, as the few illustrations will show (Figs. 256, 257).

The *Mayo Clinic* building, Rochester, Minn. (Figs. 258-261), built by the Drs. Mayo for their own private work, is in effect an out-patient building, but contains extensive and well-planned laboratories. The whole of the third floor and part of the ground floor are given up to research.

Attention is called to the laboratories of the *Ohio Valley General Hospital,* Wheeling, W. Va. (Fig. 99), and to those in the out-patient departments of the *Royal Victoria Hospital,* Montreal (Fig. 280), and the *Ottawa Civic Hospital,* Ottawa (Fig. 79).

The *Royal Victoria Hospital,* Montreal, felt the need of more accuracy in handling nephritis and other metabolic dis-

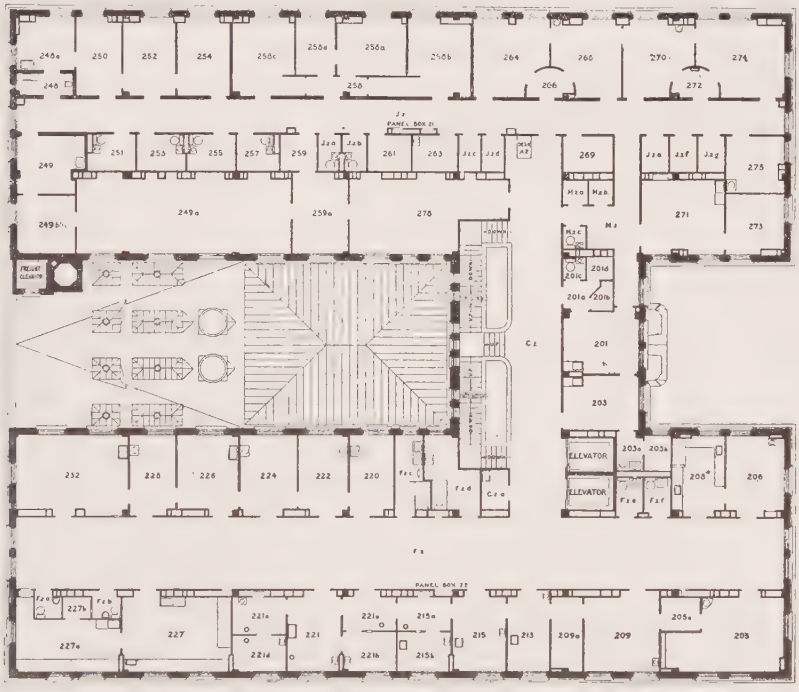


FIG. 259. MAYO CLINIC, ROCHESTER, MINN. SECOND FLOOR PLAN .
Ellerbe & Round, Architects.

Room 271 Cystoscopic.
Room 273 Private office, Braasch.
Room 201 Cystoscopic.
Room 203 Cystoscopic.
Room 205 Refraction.
Room 209 Eye.
Room 209a Eye.
Room 213 Eye.
Room 215 Nose and throat.
Room 221 Nose and throat.
Room 227 Laboratory, bacteriological.
Room 227a Laboratory, parasitological.
Room 232 Clinical.
Room 228 Clinical.
Room 226 Clinical, blood cultures, etc.
Room 224 Clinical.
Room 222 Clinical.
Room 220 Clinical.
Room 259a X-Ray indexing.
Room 278 X-Ray viewing.
Room 249a X-Ray storage.
Room 249 Fluoroscopic.
Room 249a Fluoroscopic.
Room 248 Food preparation.
Room 248a Exposure, X-Ray.
Room 250 Exposure, X-Ray.
Room 252 Exposure, X-Ray.
Room 254 Exposure, X-Ray.
Room 258c Developing.
Room 258b Developing.
Room 264 Exposure.
Room 268 Exposure.
Room 270 Exposure.
Room 274 Exposure.
Room 275 Private office.
Room J2b Toilet, men, special, public.
Room J2b Toilet, women, special, public.

eases. They therefore set aside a small wing which they call their "Metabolism Clinic," providing for in and out patients, laboratory and kitchen. The laboratory makes analyses of blood, urine, gases, and food (Fig. 262).

Filing Space. In all laboratories, adequate provision should be made for the filing of records, plates and specimens, and for stenographic or clerical work.

THE ROENTGEN-RAY DEPARTMENT.

The Roentgen-ray, in its divers uses, plays a most important part in the work of every hospital. It has become invaluable in diagnosis. The larger hospitals employ a man for this work alone, and while it is true that the best results can be had only by an expert, no hospital can get along without some provision for X-ray examinations. There must be facilities for dealing with fractures and for making stomach and intestinal diagnoses. Where a Roentgenologist is employed, examinations of many of the soft tissues will be required and more extensive provision must be made. As with laboratory work, a department which ten years ago was counted luxurious, is now barely sufficient for ordinary work.

A few *principles* may be mentioned in providing for this department:

In selecting Roentgen laboratory avoid cellar, particularly if it is damp; moisture causes trouble with the transformer and high tension wiring.

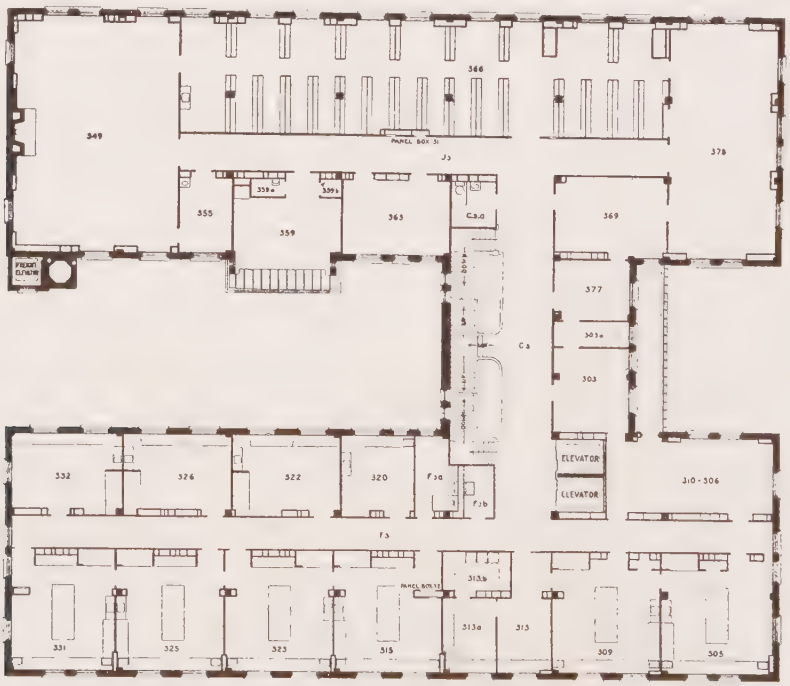


FIG. 260. MAYO CLINIC, ROCHESTER, MINN. THIRD FLOOR PLAN.
Ellerbe & Round, Architects.

Room 377 Editorial.
Room 303 Editorial.
Room F3a Toilet staff, men.
Room 305 Pathological laboratory.
Room 309 Pathological laboratory.
Room 313 Stenographic.
Room 315 Pathological laboratory.
Room 323 Pathological laboratory.
Room 325 Pathological laboratory.
Room 331 Chemical laboratory.
Room 363 Reading.
Room 320 Pathological laboratory.
Room 359 Artists' studio.
Room 355 Coat room.
Room 349 Assembly room.
Room 366 Stock room.
Room 375 Reading room.
Room 369 Reprints.

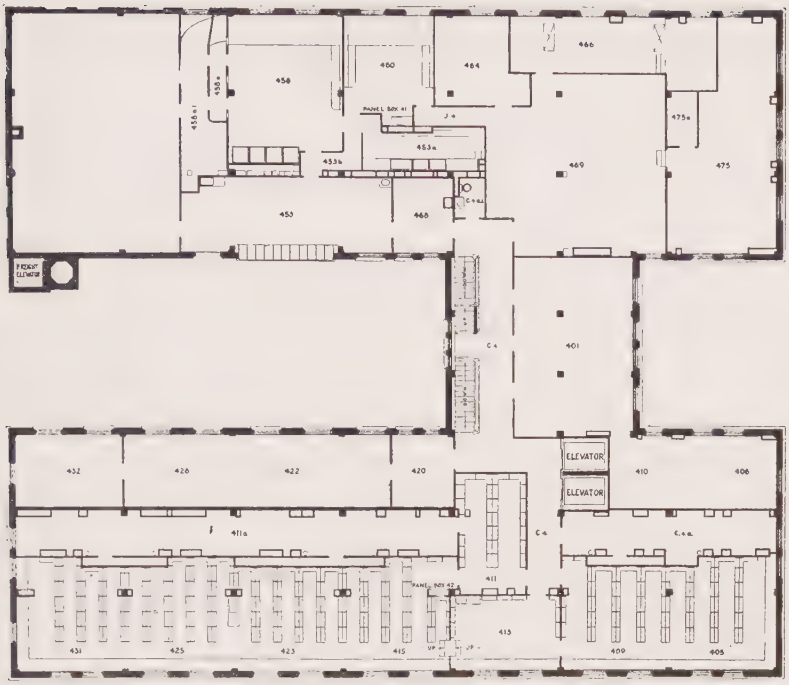


FIG. 261. MAYO CLINIC, ROCHESTER, MINN. ATTIC.
Ellerbe & Round, Architects.

Room 401 Store room.
Room 409-405 Pathological museum.
Room 411 Pathological store-room.
Room 420 Drafting.
Room 413 Pathological preparation.
Room 422 Shop.
Room 469 X-Ray store-room.
Room 466 X-Ray machines.
Room 464 X-Ray dry plates.
Room 460 Photographic store-room.
Room 458 Bromide room.
Room 453a Developing.
Room 468 Waiting room.
Room 453 Photographic gallery.

Courtesy, *The Modern Hospital.*

FIG. 262. LABORATORY, METABOLISM CLINIC, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.

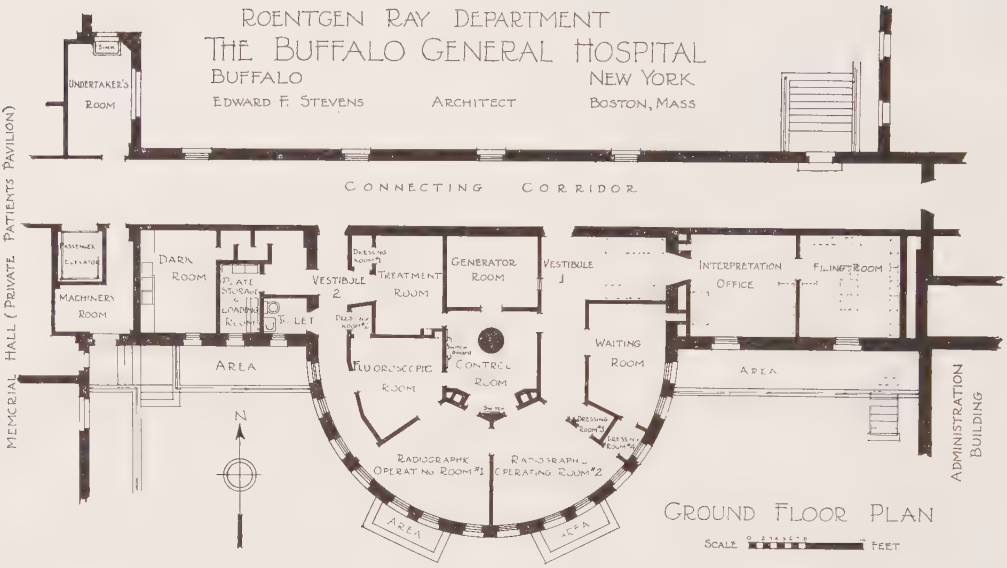


FIG. 263. ROENTGEN-RAY DEPARTMENT, BUFFALO GENERAL HOSPITAL, BUFFALO, N. Y. Edward F. Stevens, Architect.

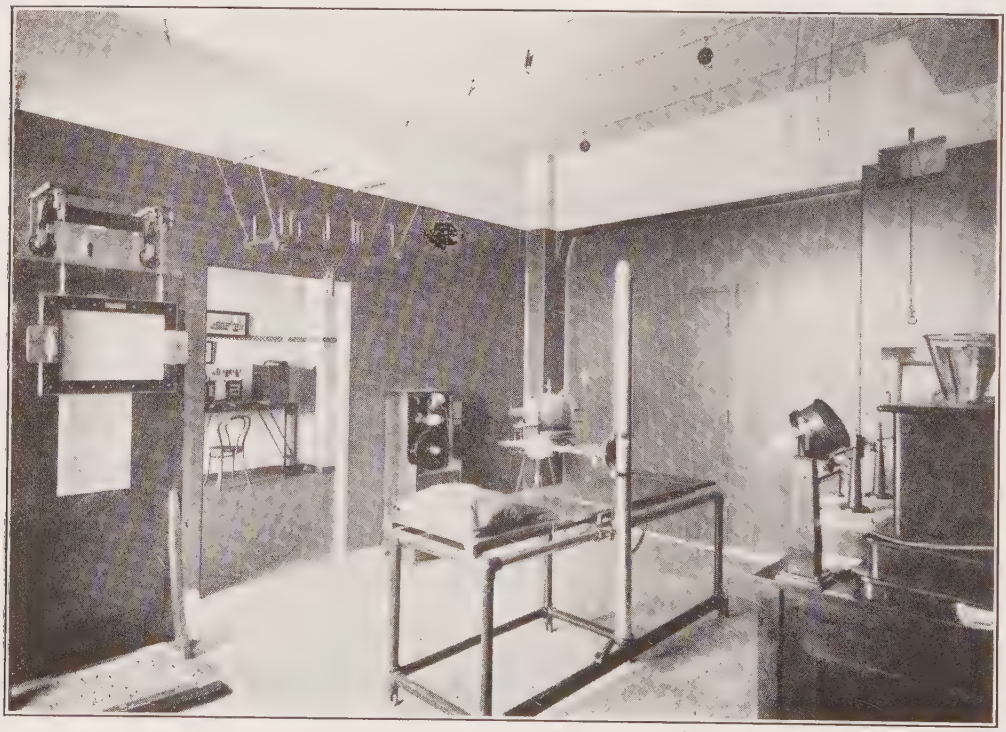


FIG. 264. ROENTGEN-RAY DEPARTMENT, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.

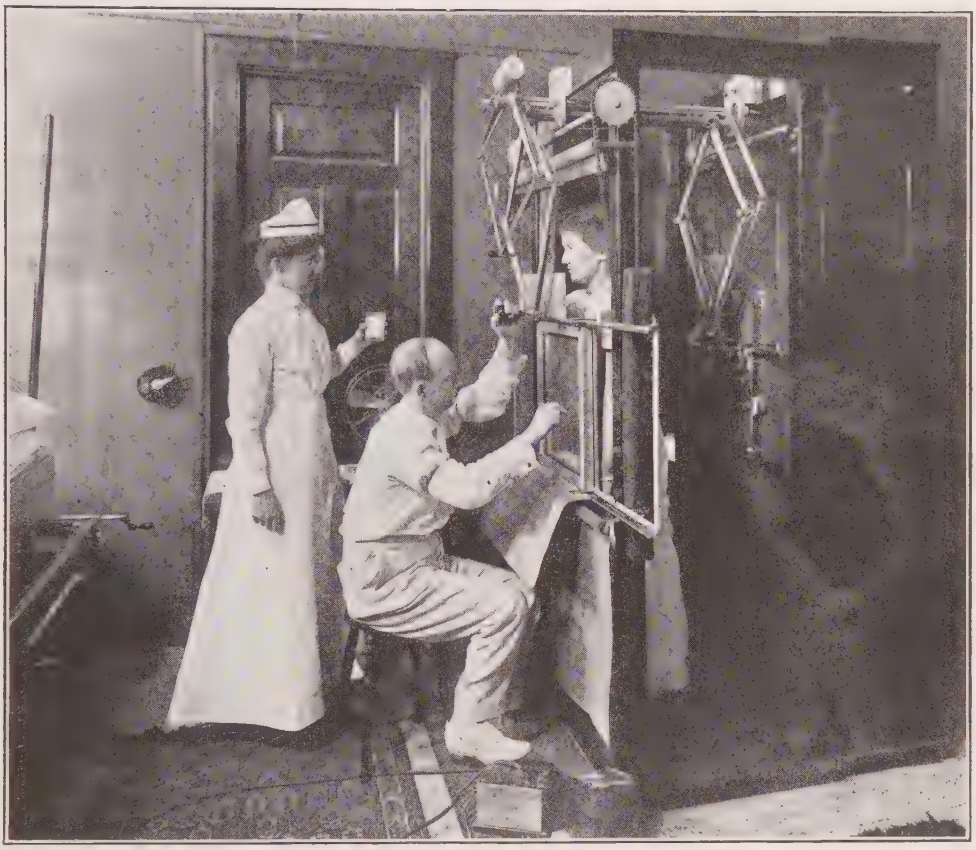


FIG. 265. UPRIGHT FLUOROSCOPE.

The room should be sufficiently high studded to allow overhead high tension system.

The X-ray transformer requires a special electric current supply. Do not rely on the word of a local electrician or power company.

Special precaution should be taken that all electric light conduits in Roentgen room are properly grounded.

Arrangements should be made for a perfect ground near position of X-ray transformer.

The room to be used for fluoroscopy should be so arranged that it can readily be made light proof.

Special lead protection is necessary where the Coolidge tube is used for X-ray therapy.

The dark room, for developing and loading plates, should be located as near the Roentgen laboratory as possible.

Hot water, as well as cold running water, in the dark room is desirable.

We know that the recurrent use of this powerful medium has caused serious burns and the destruction of live tissue so that the operators should have every possible protection. Lead screens afford this protecton against both direct and reflected rays. It is more common now to provide control rooms heavily lined with lead at least one-eighth inch thick; and where vision is required, lead glass is used for the operator.

This department should be planned for at the beginning, not left to chance.

Probably there is no more elaborate example of the use of the X-ray in diagnosis than at the *Mayo Clinic,* Roches-

ter, Minn. (Fig. 259). Half of the second floor of the building is devoted to this purpose.

The *Buffalo General Hospital,* Buffalo, N. Y., has a separate building for its Roentgen-ray department (Fig. 263). The control room is in the center, and around it are situated the two operating rooms, a treatment room, fluoroscopic and waiting rooms. At the left are the dark and loading rooms, developing department, etc. On the right are the filing and viewing rooms.

In the *Notre Dame Hospital,* Montreal, the X-ray department is not large, but is quite complete (Fig. 92). The control room is between the two operating rooms; there is a good dark room, a viewing room, space for storage, etc.

Attention may be called to the Roentgen-ray departments of the *Ottawa Civic Hospital, Ottawa* (Fig. 79), and that of the *Royal Victoria Hospital,* Montreal, in the out-patient department (Fig. 280). Small departments are shown in the *Ohio Valley General Hospital,* Wheeling, W. Va. (Fig. 101), the *Youngstown,* Ohio (Fig. 124) Hospital, and the Barre (Vt.) Hospital (Fig. 290).

CHAPTER XII.

The Out-Patient Department.

Today nearly every large hospital in the country has an *out-patient and social service department*, where more or less dispensary work is afforded people who are not enrolled as patients of the hospital, or more home care is provided.

The location of the hospital in the community, the likelihood of casualties, and the nearness to other dispensaries have a bearing on the development of this department. Except, perhaps, in the large city communities, this dispensary or out-patient service can be rendered more effectively in connection with the general hospital; for the reason that many of the departments can be used in common, such as the drug room, the Roentgen-ray department, the hydro and mechano-therapeutic departments, the heating plant, and, in emergencies, the service of members of the staff and nursing forces.

The size and shape of this department must be governed by the needs and the available space. If the call is small, it may be placed safely in the basement of one or more of the hospital buildings, or on certain floors set apart for this purpose.

Mackintosh* says, "The out-patient department should be a one-storied building, quite apart from the hospital."

Davis and Warner (†) prefer a two-storied, rectangular building with a central light court in the second story. If the plot of ground available is restricted, the building may be three or four stories, but not more than 36 to 40 feet in width.

Figs. 266 and 267 show an ideal rectangular plan. In the basement there is space for clinical records, lockers and lavatories for employes, and if the building is independent of a hospital, a drug store-room, general store-room, and the heating plant.

Fig. 268 shows one floor of a long rectangular plan, for a unit thirty-six feet wide. The admitting hall and administrative department are on the floor below. (*)

The L-shaped building often affords a better division of departments than the rectangle, since the large waiting room can be placed at the junction of the two wings, giving better supervision from the administrative center.

Davis and Warner set the following standards: "In locating an out-patient building with reference to the other buildings of the hospital it is to be borne in mind that the dispensary may receive more patients than all the other parts of the hospital put together. Hence its entrance should be as accessible as possible from the main streets, and yet not be so placed as to interfere with ambulances, automobiles, patients or visitors coming to the building. It is highly important that the laboratories of the hospital and the X-ray department shall be accessible to the dispensary, so that examinations of either kind can be made with the least possible transference of patients.

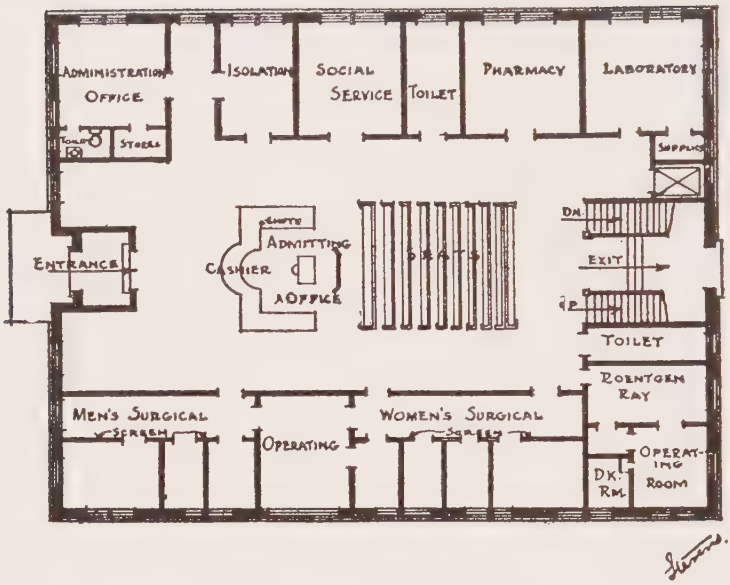
If the dispensary is located in one wing of a group of hospital buildings, it is most desirable to have this wing close to the main administrative portion of the hospital. Large numbers of patients are referred to and from the dispensary and the wards. The record rooms for the hospital and dispensary are best managed if close together." (†)

Principles. Whether this department be in a separate building of one story or multi-story, or connected with any other department, there are certain practical principles to be considered.

The *entrance* should be large and well protected from storms. As many of the out-patients are children-in-arms, adequate provision must be made for peram-

* "Construction, Equipment and Management of a General Hospital," by Donald Mackintosh, M.B.
†"Dispensaries," by Michael W. Davis and Andrew R. Warner, Macmillan, 1918.

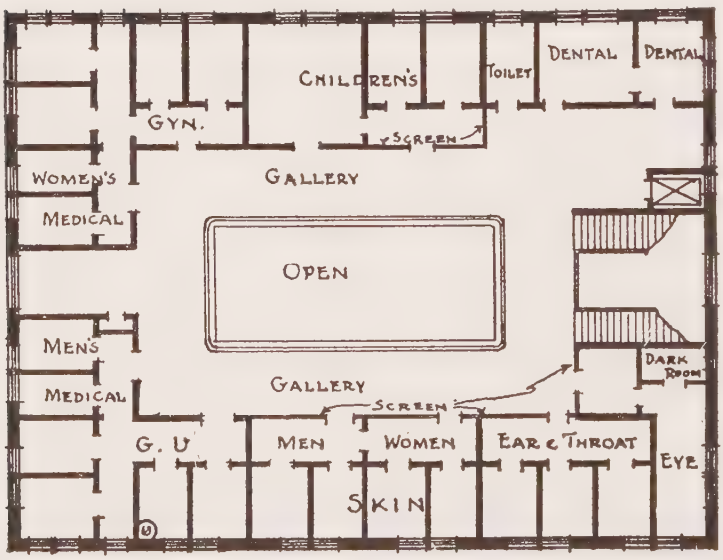
*These plans were made by the author for Davis and Warner's book.
†"Dispensaries," by Davis and Warner, Macmillan, 1918.



FIRST-FLOOR-PLAN

SCALE 0 16 32 FEET

FIG. 266. RECTANGULAR BUILDING FOR OUT-PATIENT DEPARTMENT.



SECOND FLOOR PLAN

SCALE 0 16 32 FEET

FIG. 267. RECTANGULAR BUILDING FOR OUT-PATIENT DEPARTMENT.

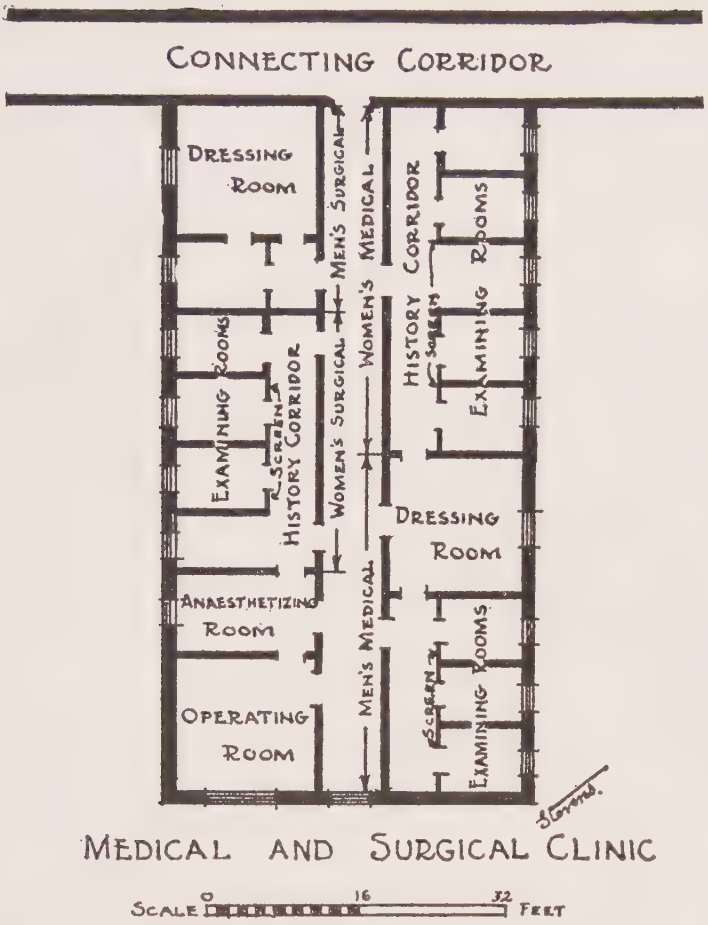


FIG. 268. LONG, RECTANGULAR BUILDING FOR OUT-PATIENT DEPARTMENT.

bulators at or near the street level.

Where practicable, the *exit* should be a separate door. Near this door can be located the laboratory and the pharmacy.

Near the entrance should be the *office* of the department, the examining rooms, and the social workers' office.

The *waiting room* should be large, well lighted, and above all well ventilated and centrally located, with the seating space so arranged as to give perfect circulation and prevent congestion. There must be space for new patients to wait near the admitting desk, for old patients until their turn comes for examination or treatment, and for pharmacy patients while their medicine is being prepared.

Near the preliminary examination desk there should be *isolation rooms* with a separate exit, for any suspicious or contagious case.

The arrangement and division of departments may depend on the respective service.

There must be ample room for all clinical *records,* so arranged that they may be easily and quickly consulted. Additional space will be required for future records, and for storing those not often consulted.

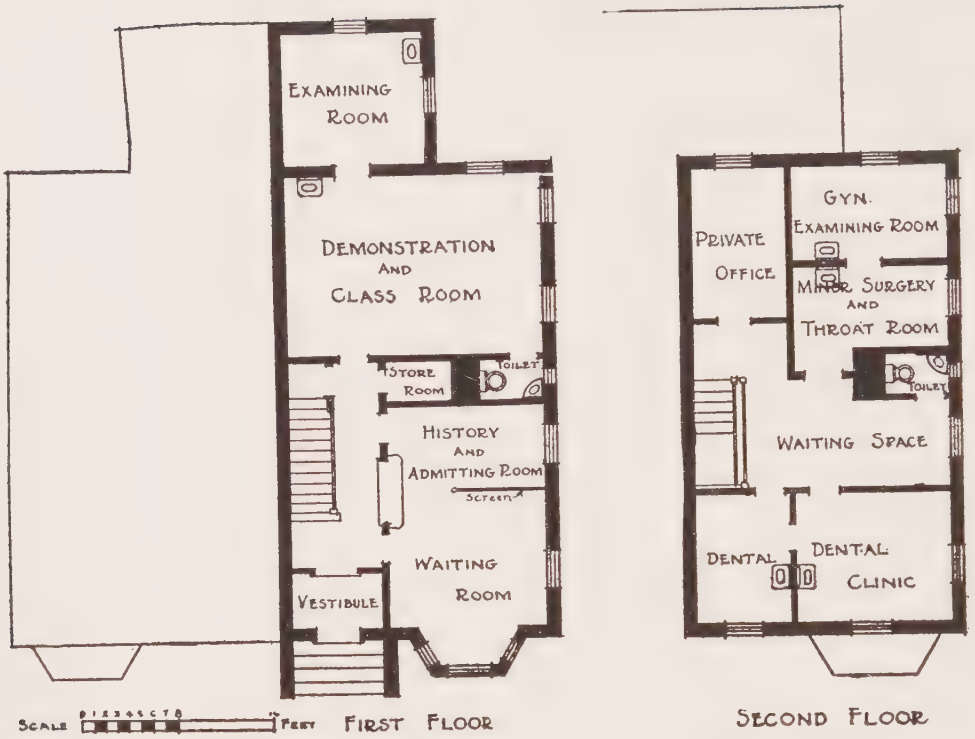


FIG. 269. HOUSE REMODELED FOR HEALTH CENTER.

There must be room reserved for the executive offices.

Laboratory and X-ray departments of considerable elaboration are necessary, unless those belonging to the hospital are available; likewise a good pharmacy.

In the small service, by the use of different rooms at different hours and by a slight change in equipment, the treatment of the different diseases can be accomplished; in fact, splendid work can be done in a very small space. But the ideal out-patient department should have space and divisions for general medical clinic, children's clinic, surgical clinic, gynecology clinic, venereal clinic, genito-urinary clinic, eye-ear-nose-and-throat clinic, and dental clinic; and as the department grows, separate space should be provided for orthopedic, nervous and mental diseases, and for the treatment of tuberculosis, whooping cough, and vaginitis.

A special clinic may be needed for poliomyelitis cases.

The work of examination and treatment is facilitated if provision is made for patients to wait at or near the treatment rooms. In some cases, separate waiting-rooms or history corridors are provided where the assistants can take down the history and prepare the patient for examination or treatment.

In providing for the clinics, the larger services such as the medical and children's services should be located on the entrance floor, in order to avoid congestion. The orthopedic, with the plaster work and brace shop, may well be located in the basement.

As to the size of the treatment rooms, there may be a difference of opinion; one man may wish a large room with, perhaps, cloth screens dividing the patients; another, a small room opening from the general room of that service, where any

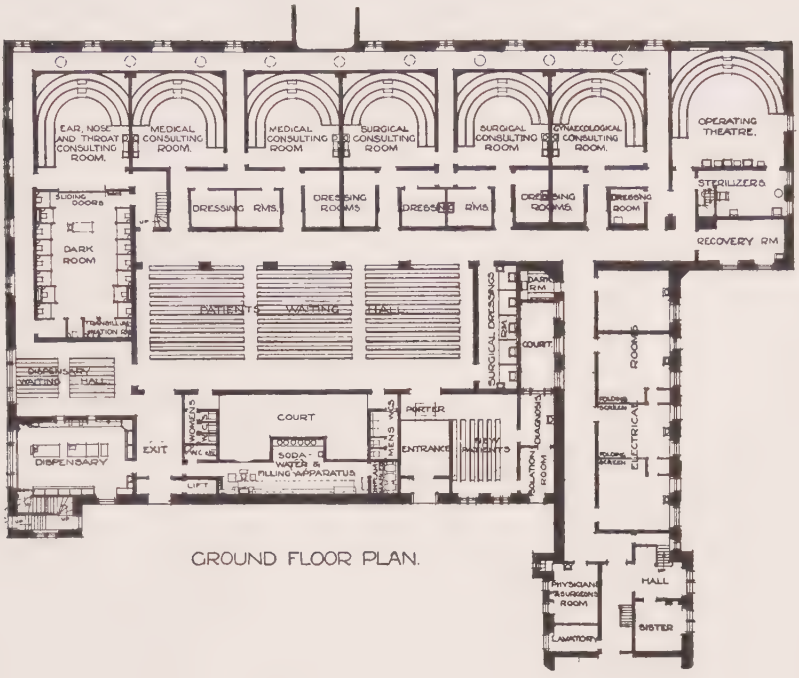


FIG. 270. OUT-PATIENT DEPARTMENT, WESTERN INFIRMARY, GLASGOW, SCOTLAND.

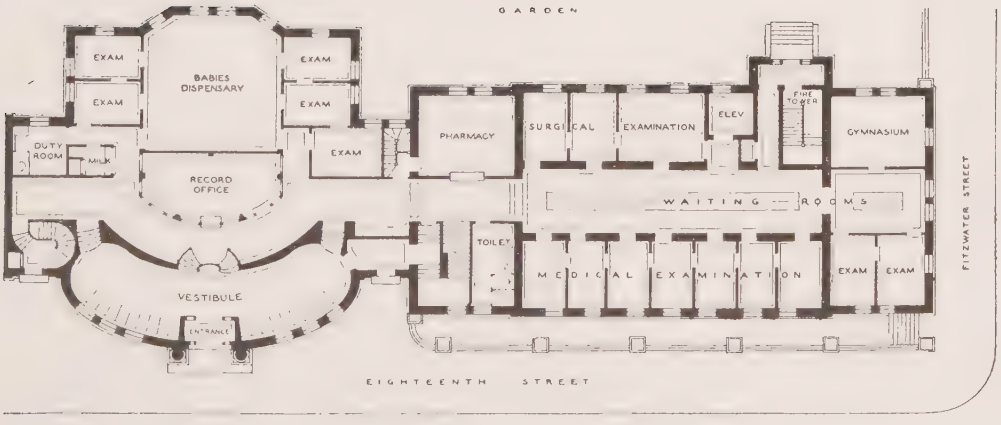


FIG. 271. OUT-PATIENT DEPARTMENT, CHILDREN'S HOSPITAL, PHILADELPHIA, PA.

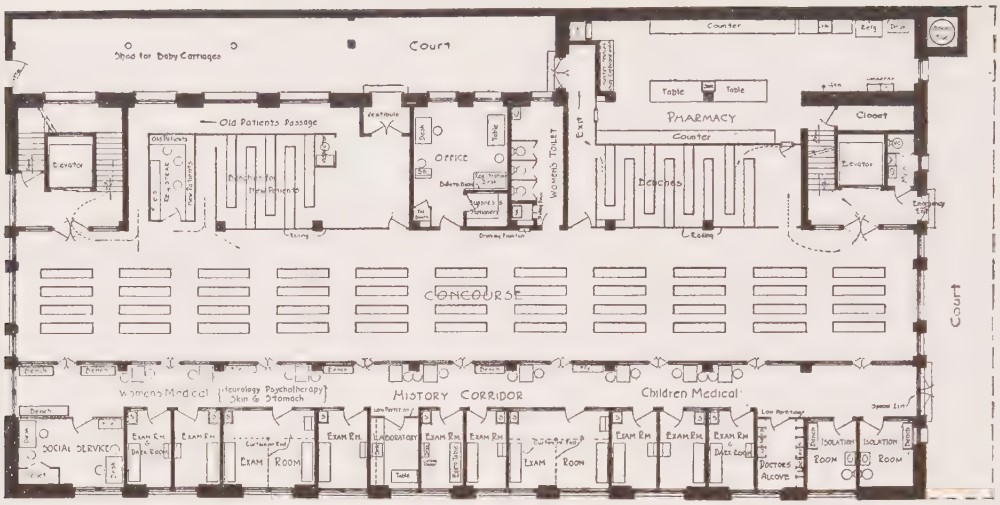


FIG. 272. PROPOSED OUT-PATIENT DEPARTMENT FOR NEW YORK CITY. FIRST FLOOR.
Designed by S. S. Goldwater, M.D.

conversation will not be overheard by the patients nearby. If the small room is used, the ventilation should be assured and positive. If the rooms are to be used for teaching purposes, they should be of larger size.

In the surgical department, there should be the complete operating room with its adjuncts—the sterilizing and anaesthetic room; and as many of the minor operations are performed under anaesthetics, recovery rooms should also be provided.

Each clinical division should be made a complete working unit, with proper plumbing fixtures, cabinets, and supplies for disinfecting against contagion, and apparatus for sterilization of instruments, etc.

The waiting room should not be void of artistic merit, for even with the out-patient, the environment should tend to

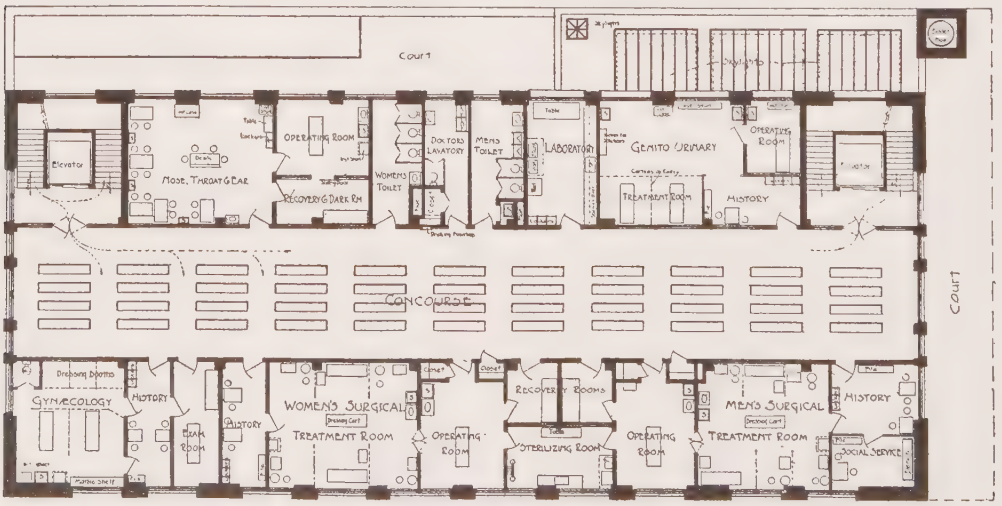


FIG. 273. PROPOSED OUT-PATIENT DEPARTMENT FOR NEW YORK CITY. SECOND FLOOR.
Designed by S. S. Goldwater, M.D.

benefit the mind as the treatment does the body.

"Hospital finish" is necessary, since numbers of people mean much dirt, and cleaning must be made easy. The floors get much harder use than those in the hospital; they should be non-absorbent and readily scrubbed. The walls, ceilings and furniture should be of simple design and easily cleaned.

Good *lighting,* both for day and night, is essential.

Even a two-story building should have an elevator, for cardiacs, feeble, lame, mothers with babies to carry, etc.

Drinking water should always be available. (*)

Davis gives the following list of rooms needed in a *small* out-patient department. (1) Admission hall, with booths for admitting, records and social service. (2) Pharmacy. (3) Medical clinic, two rooms, or one with a booth partitioned off. (4) Surgical clinic, three rooms. (5) Children's clinic, one room. (6) Eye, ear, nose and throat clinic, two rooms. (7) Dental clinic.

He also gives a plan for remodelling a house so that it can be used as a health center and dispensary combined (Fig. 269).

A more complete out-patient department is hardly to be found than that of the *Western Infirmary* at Glasgow (Fig. 270). From the time the patient enters until he leaves, it is not necessary for him to cross his own path. He finally comes up in front of the dispensary and goes thence to the exit.

At the entrance is the preliminary waiting-room for new patients, with its isolation and diagnosis room; then the large central waiting; the special treatment room for eye, ear, nose, and throat; for minor dressings; and the various surgical and medical clinic rooms, with dressing-rooms connected; each unit a teaching theatre, with circular benches for students, with the dispensary near the exit.

A special students' entrance is provided, with corridor above and exit passage, connecting with each of the clinic rooms.

The first building of the *Children's Hospital,* Philadelphia, as planned, is for *out-patients.* Entrance is through a large vestibule arranged for the storage of baby carriages. A record office fills a commanding position. The babies' dispensary, with examining rooms and a milk

* Further elaboration of these points will be found in Davis and Warner's book, in the chapter on buildings.

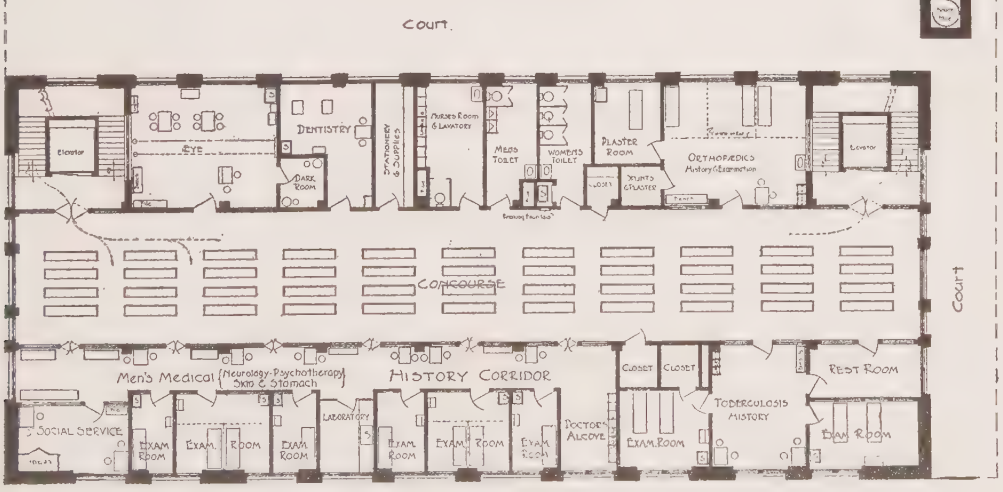


FIG. 274. PROPOSED OUT-PATIENT DEPARTMENT FOR NEW YORK CITY. THIRD FLOOR.
Designed by S. S. Goldwater, M.D.

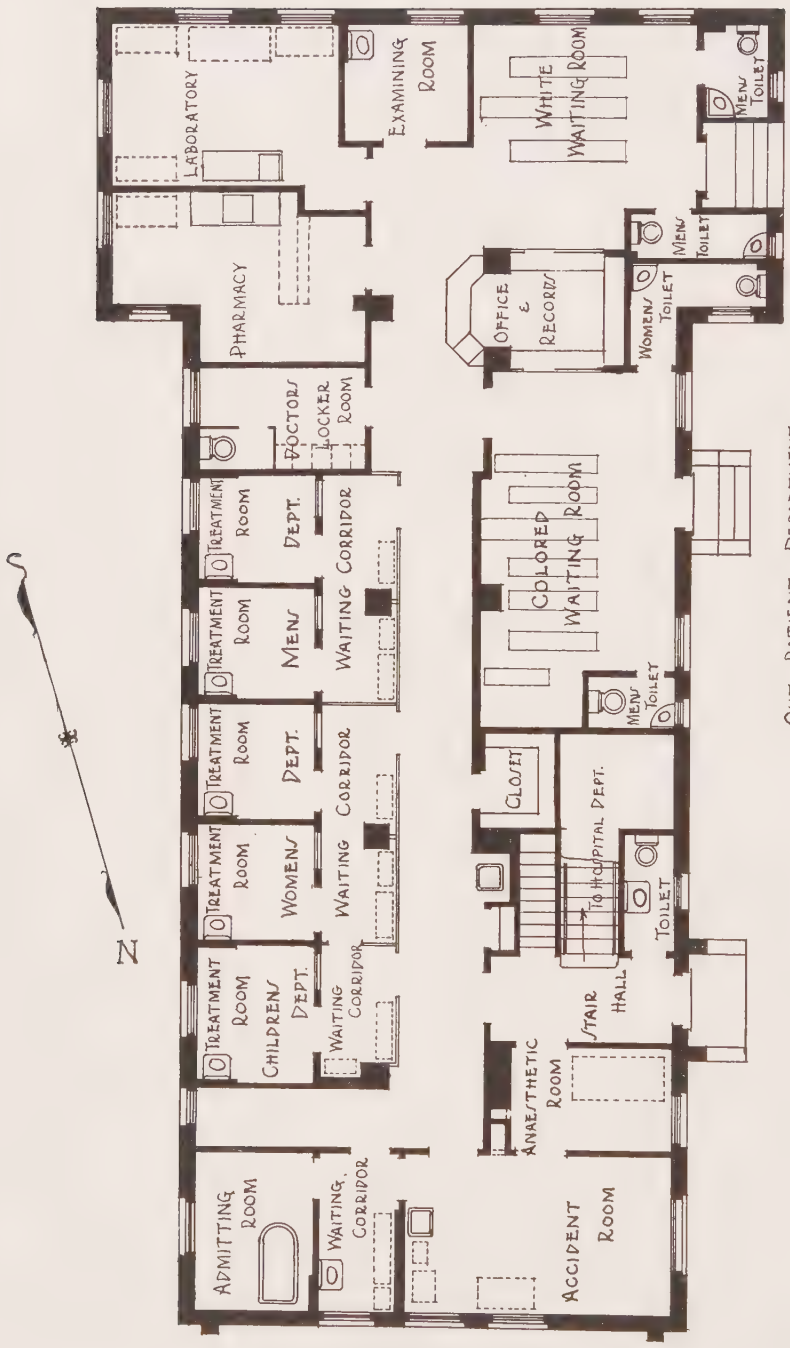

LABORATORY
EXAMINING ROOM
WHITE WAITING ROOM
MENS TOILET
PHARMACY
OFFICE & RECORDS
WOMENS TOILET
DOCTORS LOCKER ROOM
TREATMENT ROOM
DEPT.
MENS
WAITING CORRIDOR
COLORED WAITING ROOM
CLOSET
TO HOSPITAL DEPT.
TOILET
WOMENS
CHILDRENS DEPT.
ANAESTHETIC ROOM
STAIR HALL
ADMITTING ROOM
ACCIDENT ROOM
N
OUT PATIENT DEPARTMENT
MACON CITY HOSPITAL
MACON GEORGIA
EDWARD F. STEVENS - ARCHITECT-BOSTON, MASS.
ALEXANDER BLAIR - ASSOCIATE ARCHITECT-MACON, GA.
PAVILION "F"
GROUND FLOOR PLAN
SCALE 0 8 16 24 FEET

FIG. 275.

and duty room adjoining, occupies the central position in the rear of the record desk. The medical and surgical examining rooms use the rest of the first floor (Fig. 271).

The plans show in the basement the detention room for suspected cases, a whooping-cough clinic having a separate entrance. The X-ray, orthopedic, and plaster rooms are on this floor. The eye, ear, nose, and throat treatment and utility rooms are on the second floor; also the operating and recovery rooms. The third floor is occupied by the laboratories.

The plan of an ideal out-patient department suggested by Dr. S. S. Goldwater in Mr. Henry C. Wright's* report on City Departments of New York, shows the working out of a three-story out-patient department on a restricted city site with buildings adjacent. The plans (Figs 272, 273, 274) show the possibilities of such

* Report of Committee on Inquiry into Hospitals and City Homes of New York City.

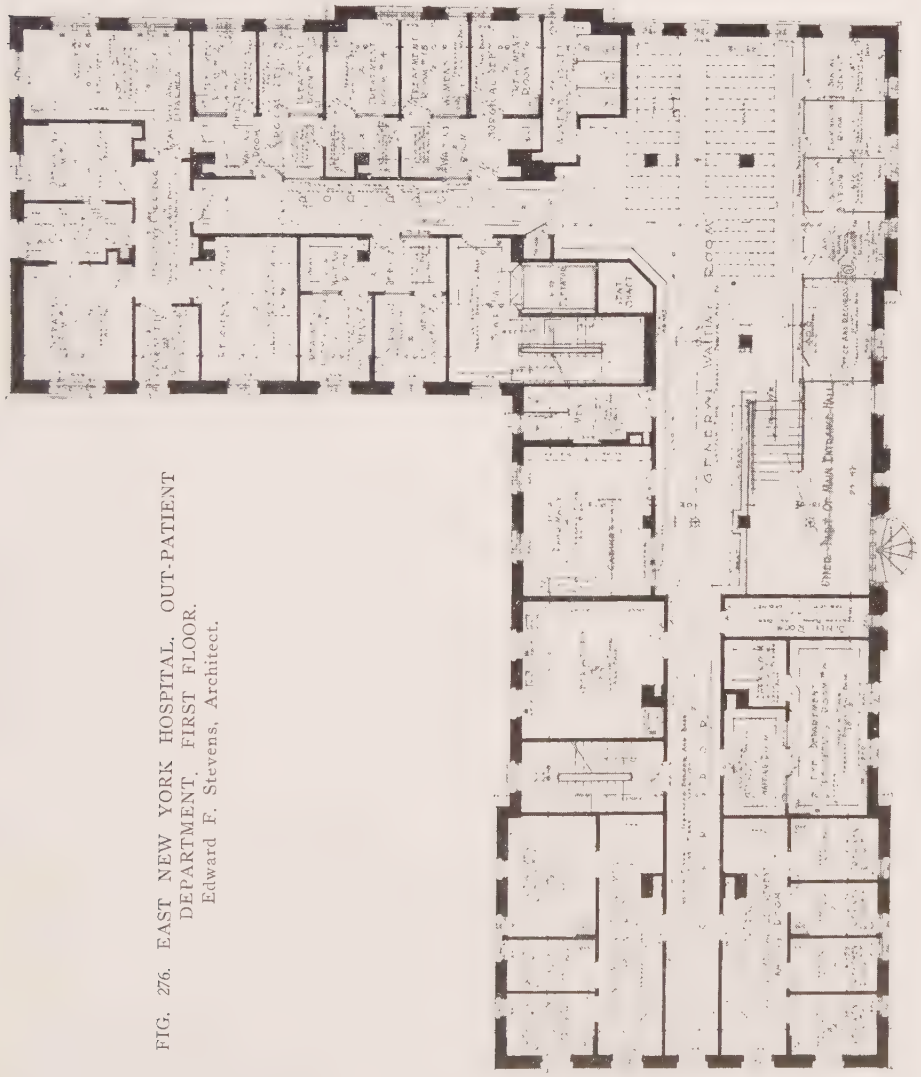


FIG. 276. EAST NEW YORK HOSPITAL. OUT-PATIENT DEPARTMENT. FIRST FLOOR.
Edward F. Stevens, Architect.

a site and the placing of the rooms and corridors to conserve light, assure circulation, and afford ease in the handling of patients.

The small out-patient department (Fig. 275) of the *Macon Hospital,* where the problem of serving the colored as well as the white must be met, shows the possibilities of even a small unit.

The waiting-rooms for both white and colored are supervised from one desk. The treatment rooms, however, are not divided. A complete operating department is here provided, which will serve, to a certain extent, for minor operations for the colored patient, the wards for whom are on the second and third stories of this building.

The dispensary building for the *East New York Hospital,* for the time being, will serve for dispensary and hospital. As shown by Figs. 276 and 277, a portion of the ground floor and all of the second will be used for out-patient service. Worked out on the "L" plan, with the waiting-room at the junction of the two wings and with the administration and examining rooms, the social service office, the pharmacy, and the laboratory in central locations, the problem of car-

FIG. 277. EAST NEW YORK HOSPITAL. OUT-PATIENT DEPARTMENT. GROUND FLOOR.
Edward F. Stevens, Architect.

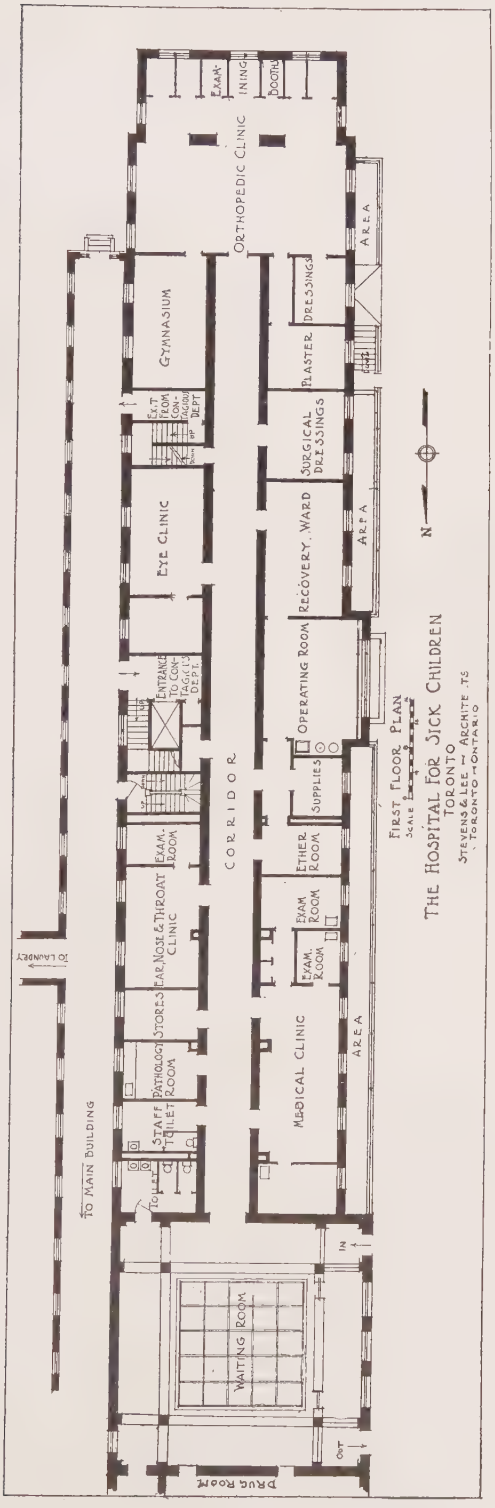


FIG. 278. OUT-PATIENT DEPARTMENT.

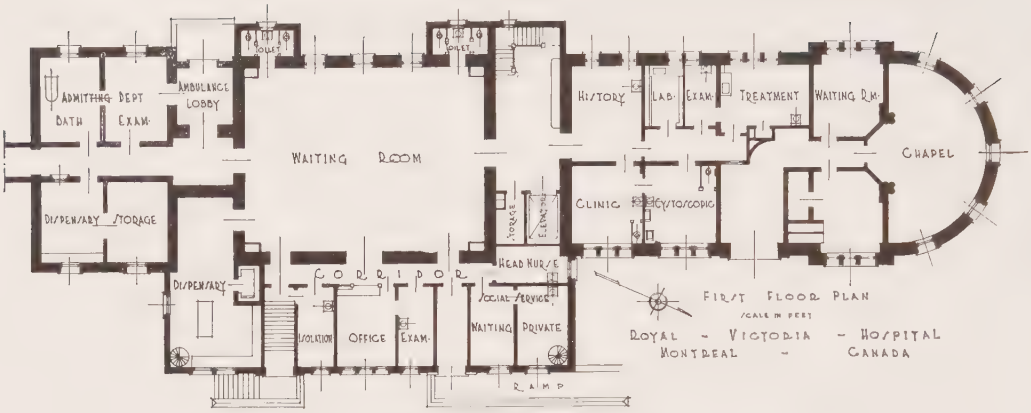


FIG. 279. FIRST FLOOR, OUT-PATIENT DEPARTMENT—ROYAL VICTORIA HOSPITAL, MONTREAL, QUEBEC.

Stevens & Lee, Architects.

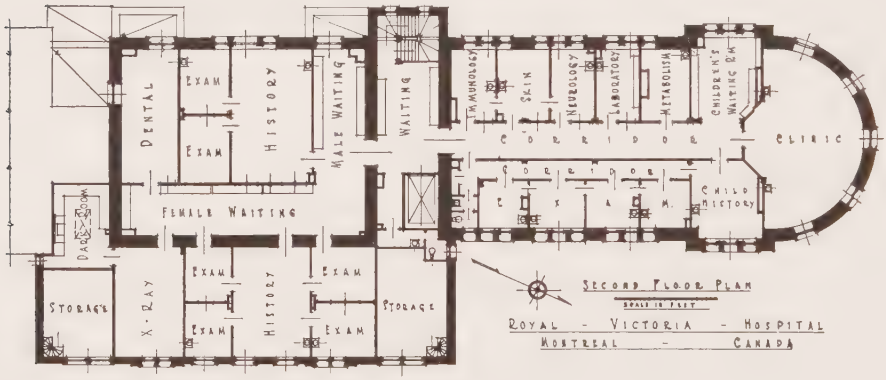


FIG. 280. SECOND FLOOR, OUT-PATIENT DEPARTMENT—ROYAL VICTORIA HOSPITAL, MONTREAL, QUEBEC.

Stevens & Lee, Architects.

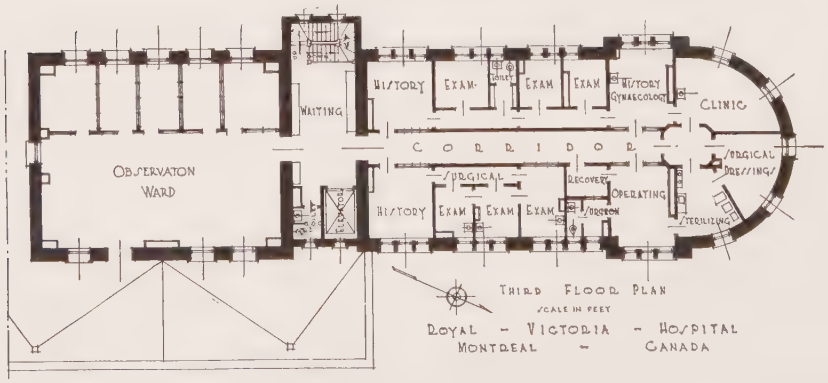


FIG. 281. THIRD FLOOR, OUT-PATIENT DEPARTMENT—ROYAL VICTORIA HOSPITAL, MONTREAL, QUEBEC.

Stevens & Lee, Architects.

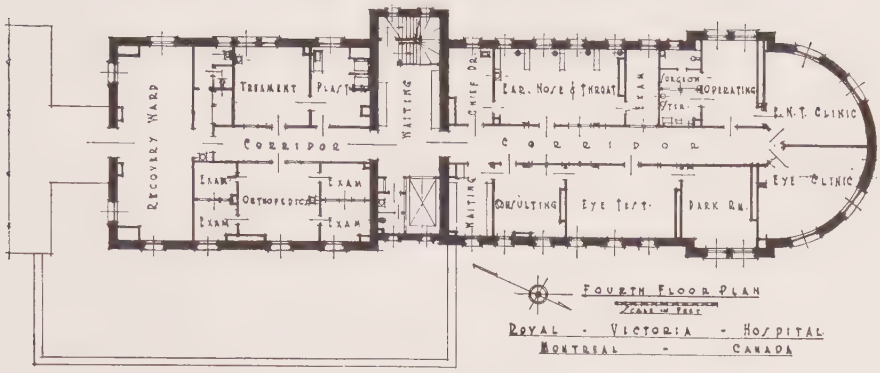


FIG. 282. FOURTH FLOOR, OUT-PATIENT DEPARTMENT—ROYAL VICTORIA HOSPITAL, MONTREAL, QUEBEC.

Stevens & Lee, Architects.

ing for the patients should be simple. The X-ray and hydro departments are on the ground floor.

While the in-patient work of the Hospital for Sick Children, at Toronto (Fig. 278), and the work at the Lakeside Home is tremendous, the *out-patient work* and the *milk dispensary* work are even greater. The entire ground and first floors of the new contagious wing and a large portion of the first floor of the old building are used for the out-patient work. The main waiting-room connects at the left with the pharmacy; the laboratories at the rear with the hospital and pasteurizing plant and at the right with the various departments including medical, surgical, eye, ear and throat, orthopedic, etc., while in the basement is a large measles clinic, and the brace and mechanical shops for making of apparatus.

The *Mayo Clinic,* Rochester, Minn. (Figs. 258-261), is a private out-patient building. The first floor is devoted to consultation rooms, the second to X-ray, microscopic work and to special examining rooms, eye, ear, nose, throat, cystoscopic, procotoscopic, etc., including provision for treatment. The third floor contains the pathological laboratories and the library. The fourth floor houses the pathological museum, the X-ray developing and storage, and various workshops. The roof contains the animal houses and experimentation laboratories. This is doubtless one of the best buildings of its sort in the country and may repay study, for its content, if not for its elaboration.*

* A detailed description appeared in the Journal-Lancet, August, 1914.

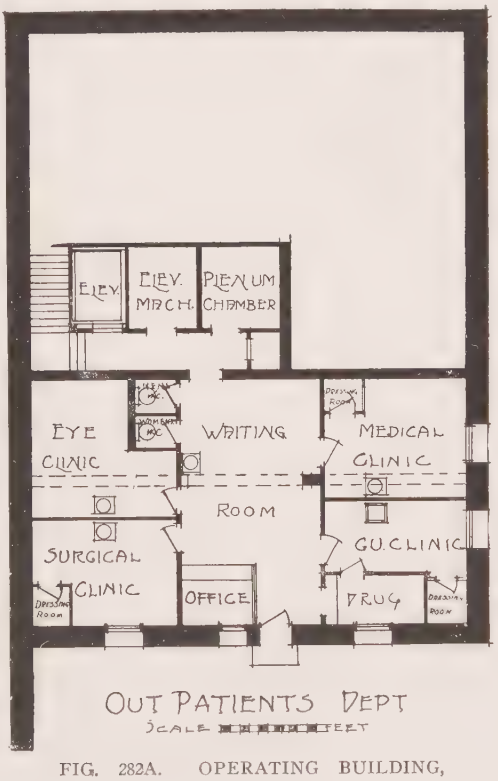


FIG. 282A. OPERATING BUILDING, YOUNGSTOWN HOSPITAL, YOUNGSTOWN, OHIO.

Edward F. Stevens, Architect.
Stanley & Scheibel, Associate Architects.

FIG. 283. FIRST AID BUILDING FOR FACTORY. EXTERIOR.
Edward F. Stevens, Architect.

At the *Royal Victoria Hospital,* Montreal, Canada, the building formerly used for pathological work has been remodelled for out-patient service (Figs. 279-282).

The large waiting room on the first floor is the center, with office, pharmacy and a special isolation room for suspected cases near by. Both in and out patients are admitted here. The second floor provides history-taking and examining rooms, dental clinic, neurological clinic, and the X-ray department. On the third floor are waiting room, operating room and dressing rooms for surgical and gynecological cases. There is also a large children's ward, partly open and partly with cubicles for isolation. On the fourth floor is the orthopedic department, with plaster and treatment rooms. The eye, ear, nose and throat clinics are here, the latter having a specially-designed booth for treatments (Fig. 417). There is a recovery ward for tonsil and adenoid cases, near the children's ward of the main hospital.

The plan of the out-patient department of the *Ottawa Civic Hospital,* Ottawa, provides for a considerable service (Fig. 79). It is divided into many small units for examination and treatment. There is a plaster room, a genecological treatment room, a dental clinic, a special department for eye, ear, nose and throat. Rooms for the operation of tonsil and adenoid cases and for their recovery are provided.

The *Robinson Memorial* of the Massachusetts Homeopathic Hospital, Boston (Figs. 160, 162), contains an excellent out-patient department. In the *Youngstown Hospital,* Youngstown, O., the department is small, but planned for the needs of this particular hospital (Fig. 282A). Examples of other small departments will be found in the *Ohio Valley General Hospital,* Wheeling, W. Va. (Fig. 99), and in *Dr. Williams'* private sanitarium, at Macon, Ga. (Fig. 285).

Industrial First-Aid Buildings. There is now hardly a factory or shop of any size without some form of first-aid equipment. Many factories and mills have rooms set apart for first-aid and surgical dressings, with a doctor or a nurse in attendance; some provide a place where the mother-worker can bring her baby and have it cared for under wholesome, hygienic conditions. A building which combines these two functions is shown herewith (Figs. 283, 284). It is planned to be built on the spacious grounds of a Massachusetts cotton mill, and will serve four purposes: (1) for dressings and minor accidents; (2) for recovery and rest rooms; (3) as a creche for the babies of the workers; (4) for a mothers' room.

SECOND FLOOR PLAN.
GROUND FLOOR PLAN.

FIG. 284. FIRST AID BUILDING FOR FACTORY. PLANS.
Edward F. Stevens, Architect.

From the mill yard one enters the main waiting room, which occupies the entire width of the building. Next this is the dressing room, equipped for minor surgical work of many sorts. There are two small wards or rest rooms, each equipped with hot and cold water; there are toilets and supply closets.

On the second floor, reached by the staircase or a bridge from the mill, is the creche or nursery. Here a mother may have her baby cared for under the direction of a nurse. Adjoining the nursery is a mothers' room. An airing balcony increases the capacity and adds to comfort in the warmer months. The exterior walls and the porch floors are of brick. The flat roof is of mill construction, slightly camouflaged by projecting rafters.

The Social Service Department

While the *social service* work in connection with hospitals and out-patient departments is a development of recent years, nevertheless it has become a most important and necessary adjunct. It is truly a twentieth-century development, starting in Boston in 1905 through Dr. Richard Cabot, who introduced the social worker as a means of securing more accurate diagnosis and rendering more effective treatment.

The social worker co-operates with the clinician. Together they take the history, one examines the patient, the other "investigates the social cause of the ailment." The physician prescribes; the social worker "follows up" the homelife, sees that the instructions of the physician are carried out, and encourages better home environment. It is obvious that if the instructions of the medical man in the clinic are not carried out, the time is wasted and the patient returns without benefit. The social service worker renders here invaluable service to the hospital, to the dispensary, and to the public.

A very large number of hospitals have added this department, and their number is increasing rapidly. No new hospital should be built, nor an addition made to an existing building, without provision for it.

The chief requirements for *social service offices* are:

1. They should be easily accessible from the out-patient department, and from the admitting department of the hospital proper.
2. The department should be divided into small rooms (not booths), so that all interviews may be strictly private.
3. There should be space for filing cabinets, easily accessible to all the interviewing rooms. These cabinets should be locked when not in use, as the records are confidential.
4. There should be space for a clerk or stenographer outside the interviewing rooms. The record cases and the stenographer's desk may be in the waiting room.
5. Opportunity for expansion should be afforded.

CHAPTER XIII.

The Small Hospital

The development of the small hospital is largely American. While the village or small hospital may have started in England, as stated by Taylor,* the greater development has been in this country. One can find hundreds of well-planned hospitals of fifty to one hundred beds; but for the smaller private hospitals, one is more likely to find the adaptation of some dwelling, doing good service but handicapped at every turn for lack of conveniences for economical and efficient work.

Every hospital must have its beginning; few indeed can start with a complete equipment; so the remodelled house should be looked upon as the stepping stone to something more complete. See Chapter XX.

It generally happens that before the house has been fitted for hospital purposes, enough money is expended to go far toward building a suitable, up-to-date institution. Even then there will be waste and unavailable room, which must be heated and taken care of. The finish which is attractive and necessary for a residence becomes almost a menace in a hospital. The staircases and halls are generally narrow, the rooms are not properly ventilated, the toilets are badly arranged, and the floor materials are not suitable. In other words, an undue amount of energy must be expended in the housekeeping for such a building, and this will detract, in all probability, from the care of the patient.

The same standards of number and size of utilities are not applicable to a fifteen-bed that would be suitable for a fifty-bed establishment, for it would be all utilities, with no room for patients.

In the very small hospital there is not the need for the separation and segregation of utilities; one room may serve for toilet, sink and bath; food may be taken directly from the kitchen to the patient; the operating room may serve for both surgical and maternity work.

Even in the small hospital the life of the patients should be safeguarded; and the construction, the egress, the careful consideration of the patient are just as important as in a large plant. Fireproof construction may not be absolutely necessary but is always desirable, and is generally an economy in the end.

It is possible, however, to meet modern requirements in the small village hospital and at moderate expense, and the examples following will show the solution here of several problems. However small, each institution must be balanced for its special location and purpose.

In the *Dr. Williams' Private Sanatorium,* Macon, Ga. (Figs. 285-287), the problem was to provide for the care of both medical and surgical cases, for offices, and for an out-patient department for colored people.

The contour of the land gave the advantage of being able to place kitchen, dining-room, and store rooms in the basement and still get proper light.

The first floor is occupied by offices, reception room, out-patients' clinic, ambulance entrance, and rooms, service and airing balcony for six patients. The ambulance entrance room and clinic opposite are made sufficiently large so that minor dressings may be done here, or even a slight operation in a septic case which one would not wish to take to the main operating room. The elevator and stairway to the second floor are near this entrance.

Though small, the operating department on the second floor is complete. There is the operating room, surgeons' scrub-up room, anaesthetizing room, and sterilizing room, with complete equipment. This department is in a wing on the north side of the building and is en-

*Brickbuilder, January, 1904.

FIG. 285. WILLIAMS' PRIVATE SANATORIUM, MACON, GA.
Edward F. Stevens, Architect.

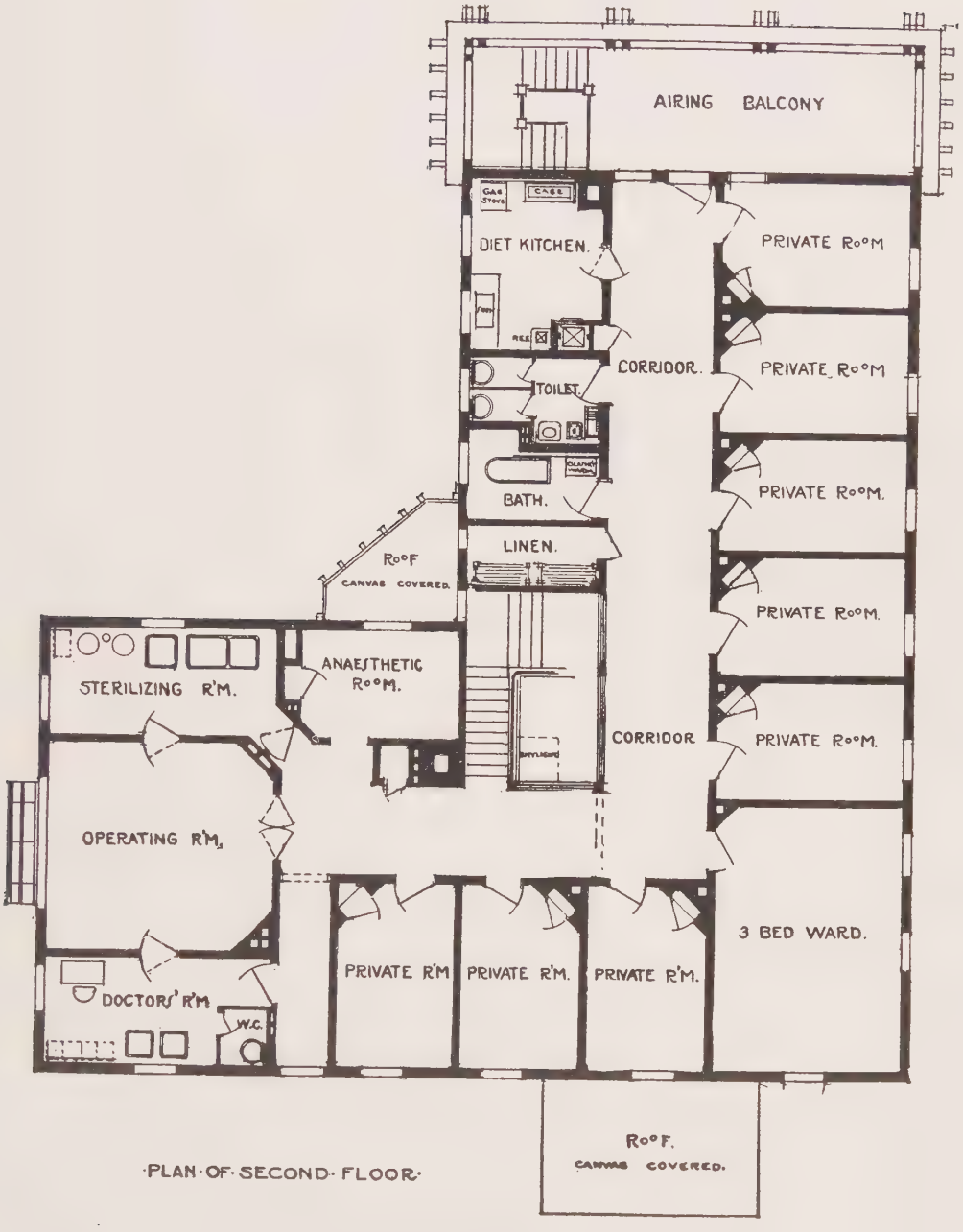


FIG. 286. WILLIAMS' PRIVATE SANATORIUM, MACON, GA.
Edward F. Stevens, Architect.

FIG. 287. WILLIAMS' PRIVATE SANATORIUM, MACON, GA. EXTERIOR.
Edward F. Stevens, Architect.

tirely shut off from the rest of the hospital.

On the main floor with the operating room are eight private rooms and a three-bed ward; also the necessary utility rooms. All rooms occupied by patients are located on the south and west. An airing balcony of sufficient size to accommodate all patients is placed on each story, on the southeast side of the building.

The nurses are accommodated in a separate building nearby.

This is a complete hospital of seventeen beds, which cost less than twenty-five thousand dollars, with all modern details, ready for furnishing.

A unique problem presented itself in planning the little hospital for the *New England Deaconness Association,* in *Concord,* Mass. (Figs. 288-289). Only ten or twelve beds were wanted, but sufficient accommodation was demanded of the kitchen for summer tent work, and an additional private ward which was added two years later.

The site is almost ideal, being on a slight eminence, with a level plateau stretching to the south, pine trees at the back, and an extended view of river and hills.

The first floor of the original or north building constituted the hospital. The front is north, and, therefore, is taken up with the combination reception room and office, and with the utilities. In the eastern extension, shut off from the main hospital, is the operating suite, consisting of operating room, sterilizing room, anaesthetizing room, and surgeons' scrub-up room. The south and west sides are devoted to the rooms of patients. An airing balcony extends the entire width of the south front, and every

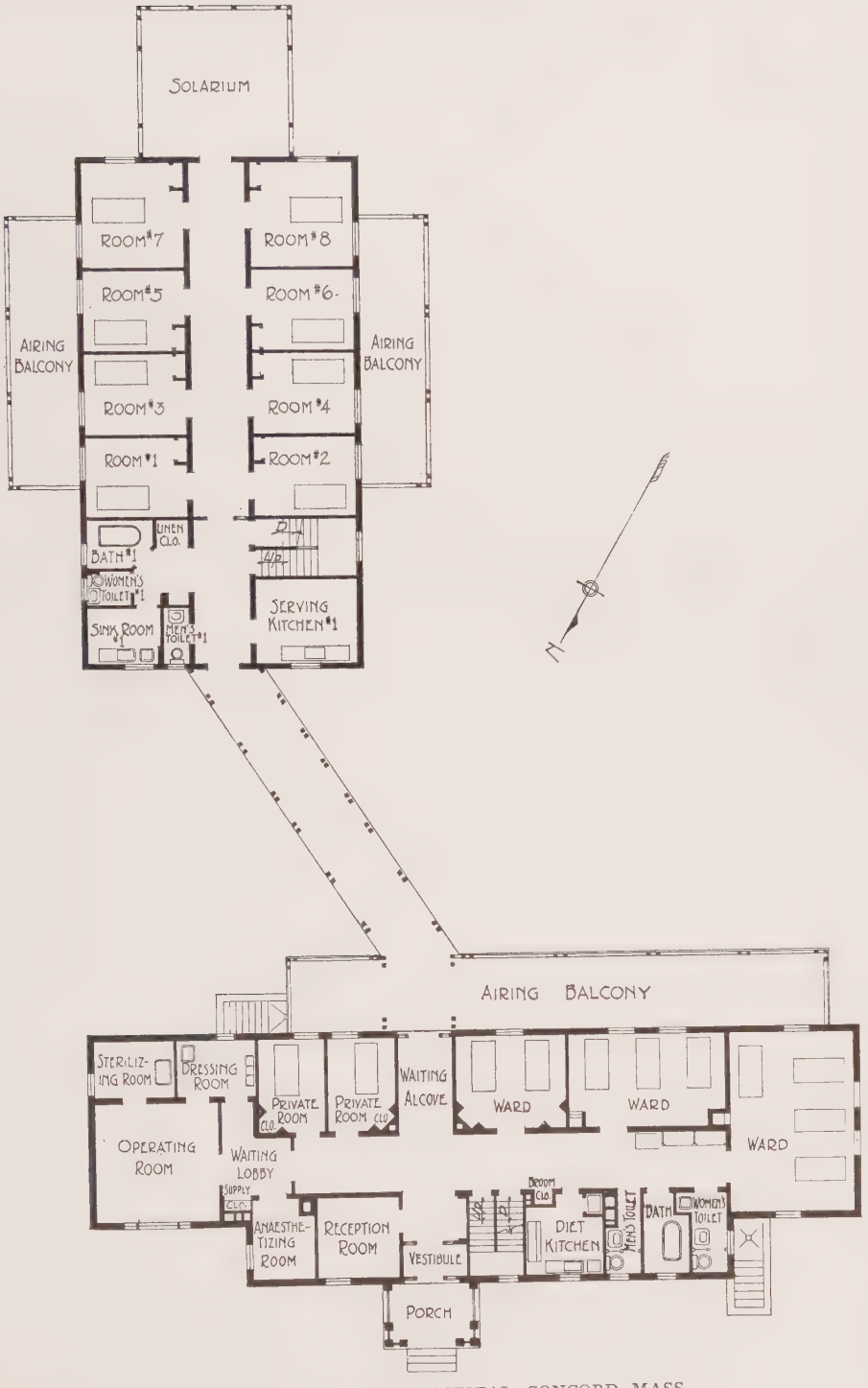


FIG. 288. DEACONESS HOSPITAL, CONCORD, MASS.
Edward F. Stevens, Architect.

FIG. 289. DEACONESS HOSPITAL, CONCORD, MASS. EXTERIOR.
Edward F. Stevens, Architect.

ward and private room opens directly upon the balcony. There is an incline from the balcony to the ground so that patients may be wheeled down; easy service to the tent wards is thus secured. There were two private rooms, now used as reception rooms, a two-bed ward, a three-bed ward, and a four-bed ward.

The basement is devoted to domestic purposes, with kitchen, nurses' dining-room, storage for supplies, heating plant, and a small hand laundry.

The second story, in the gambrel roof, provides sleeping accommodations for the superintendent, four nurses, and three servants, all in single rooms, with a pleasant sitting-room at the west.

As high pressure steam or gas was not available here, electricity was employed for the diet kitchen and for sterilizing.

The original hospital building is fireproof and cost, ready for occupancy, less than twenty thousand dollars.

The small private pavilion, accommodating eight private patients, relieves the original building and affords room for the increasing demand.

The second story of the new wing, also fireproof, occupied temporarily by nurses, is so constructed that with slight alterations the private service can be increased to sixteen beds.

A small city hospital, where the ground is more or less restricted, certainly should consider only fireproof structure.

The *Barre (Vt.) City Hospital* (Figs. 290-293) is another solution of the small hospital problem. Located on one of the hills overlooking the city and taking advantage of the southeasterly slope for sunlight and air, the simple brick building with its broad brick porch bids welcome to the visitor or patient.

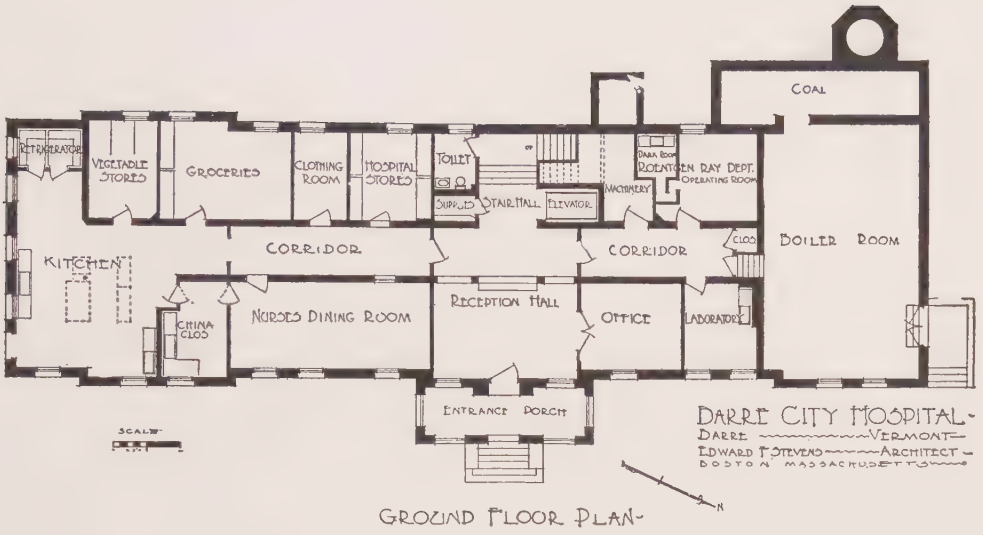


FIG. 290. BARRE CITY HOSPITAL, BARRE, VT.
Edward F. Stevens, Architect.

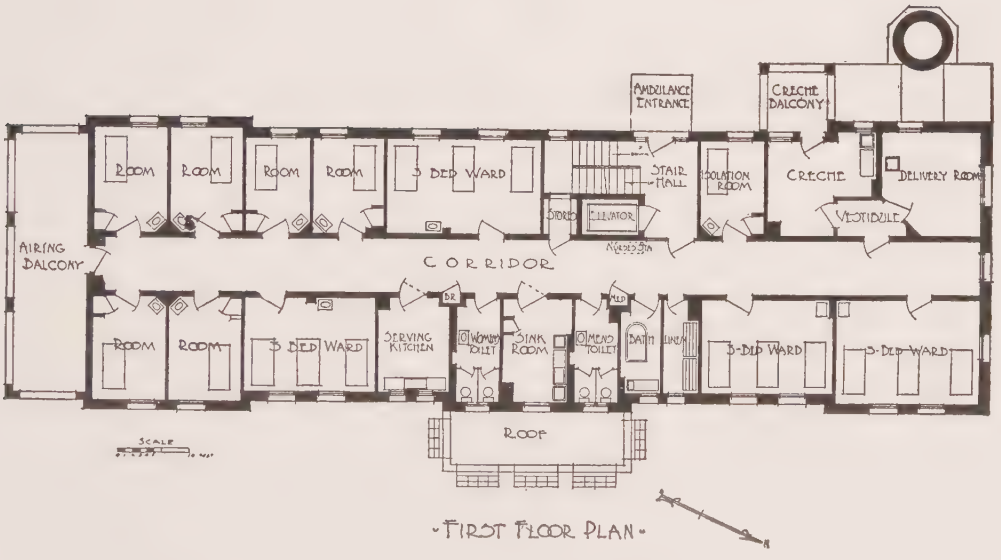


FIG. 291. BARRE CITY HOSPITAL, BARRE, VT.
Edward F. Stevens, Architect.

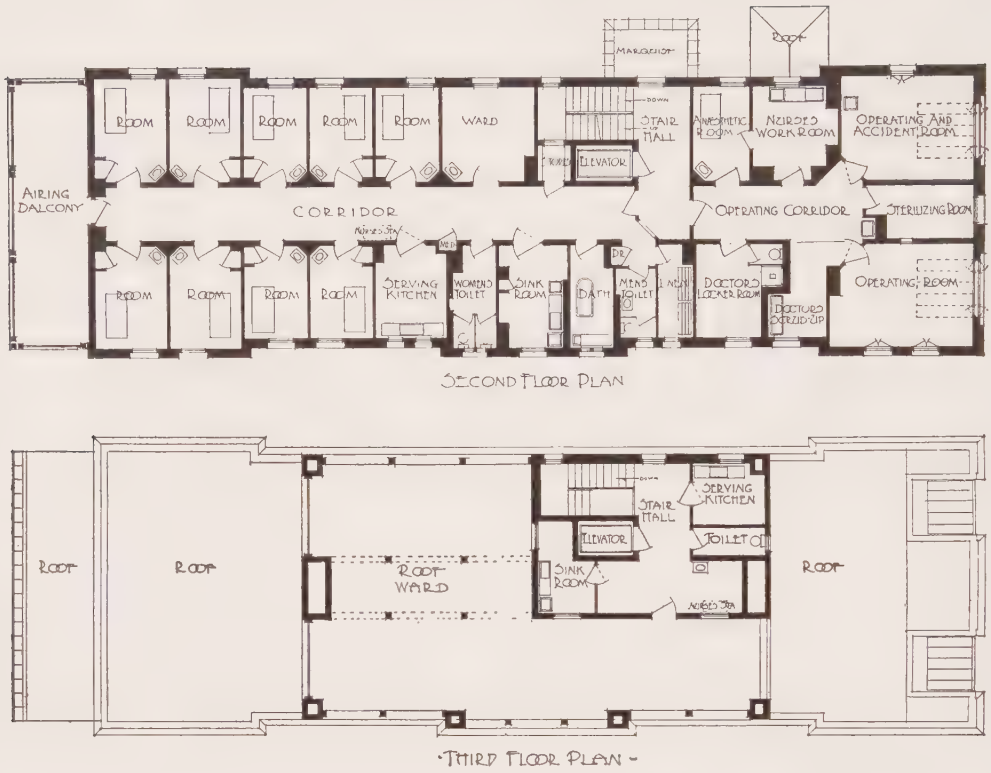
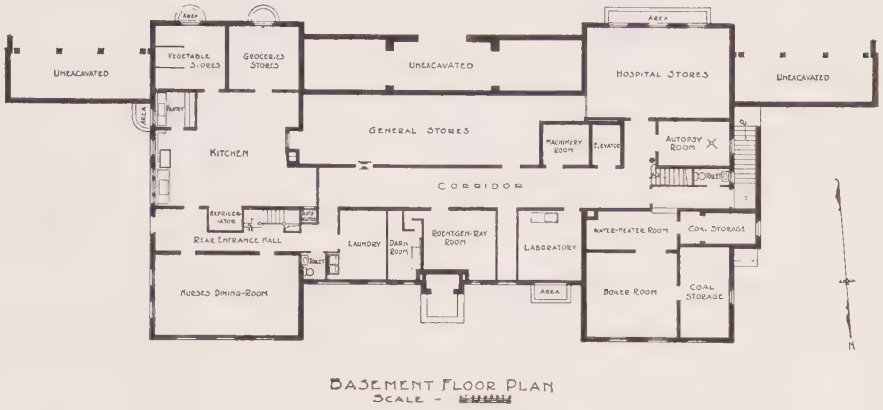


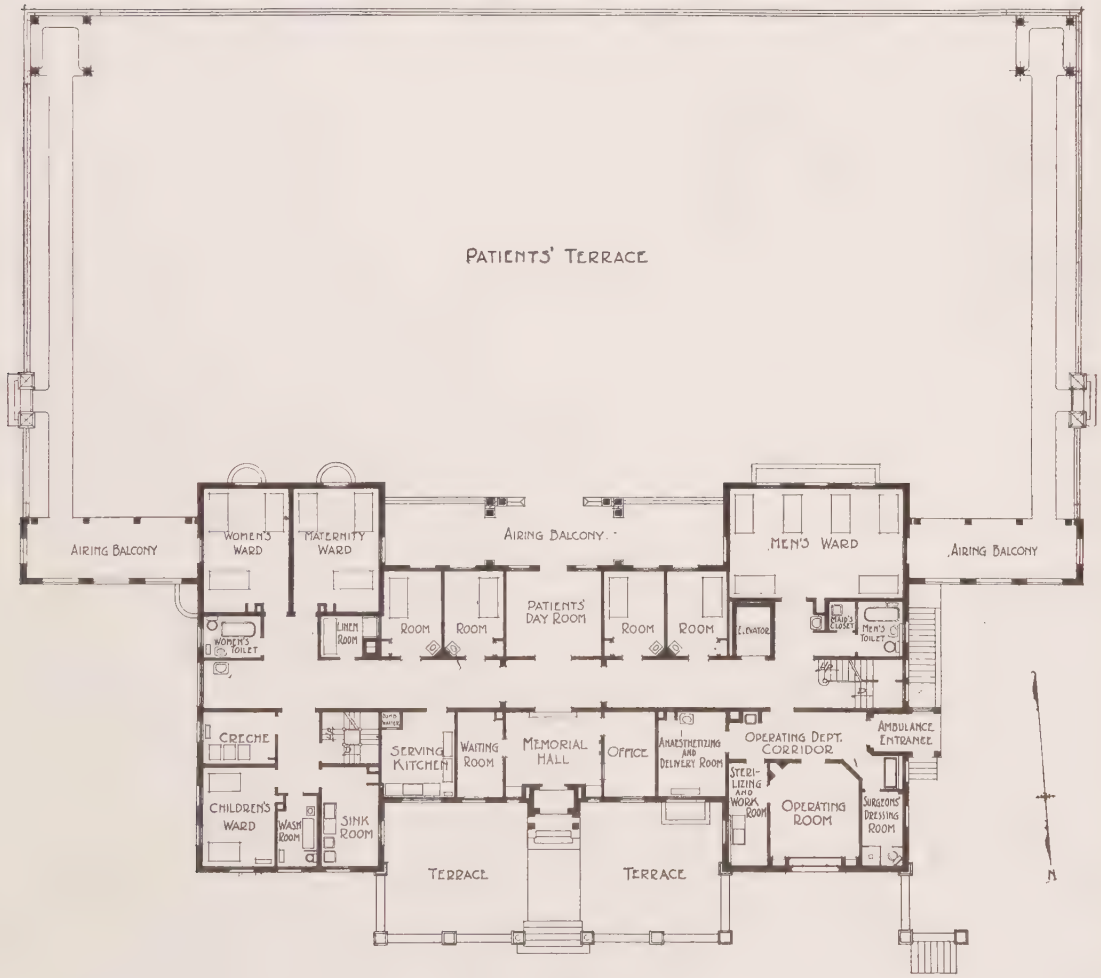
FIG. 292. BARRE CITY HOSPITAL, BARRE, VT.
Edward F. Stevens, Architect.

FIG. 293. BARRE CITY HOSPITAL, BARRE, VT.
Edward F. Stevens, Architect.



BASEMENT FLOOR PLAN
SCALE -

FIG. 294. BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL, IPSWICH, MASS.
Edward F. Stevens, Architect.



FIRST FLOOR PLAN
SCALE

FIG. 295. BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL, IPSWICH, MASS.
Edward F. Stevens, Architect.

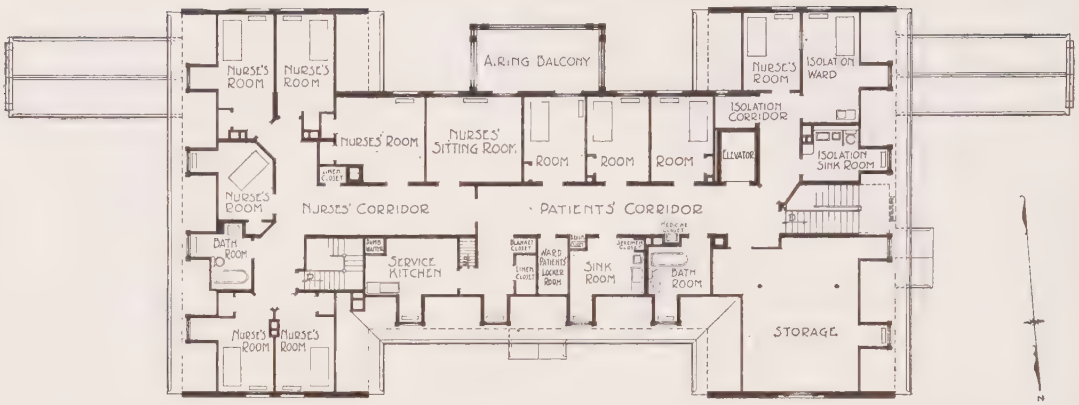


FIG. 296. SECOND FLOOR PLAN, BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL, IPSWICH, MASS.

Edward F. Stevens, Architect.

On the entrance level or ground floor are located the administration, the heating and kitchen departments, as well as the Roentgen-ray and laboratory departments; and, with the easterly side wholly above ground, light and air are not sacrificed.

The grade permits entrance to the first floor on the westerly side, where the ambulance door is located.

With all the general offices and utilities placed on the ground floor, the first and second floors are left free for the care of patients.

In planning this hospital no large wards were provided, for it was felt that a better segregation could be obtained with smaller wards. On the first floor were located four three-bed wards, seven single wards, and a small maternity department, entirely isolated, with delivery room, creche, and bathing department.

The second floor is almost wholly devoted to private patients and consists of one four-bed children's ward and nine private wards. A complete operating department is also provided on this floor, composed of two operating roms, anæsthetic room, nurses' work room, sterilizing room and surgeons' locker rooms, all shut off from the patients' quarters and planned for the most efficient service.

On each floor ample serving kitchens, sink rooms, bath and toilet rooms, linen storage closets, medicine closets, and nurses' stations are provided.

Large airing balconies at the south afford opportunities for patients to be wheeled into the open air. All doors are wide enough for beds, and all beds are provided with trucks, while the elevator connects all floors.

Perhaps the most interesting feature of this thirty-two-bed hospital is the extensive roof ward, equipped with all the conveniences and accessories of indoor wards and commanding a wonderful view over the city and the adjoining hills.

The materials of construction are common brick, granite and terra cotta, with floor construction of iron and concrete; the interior walls of hollow tile; the finished flooring is of terrazzo, cement, and linoleum; the finish is simple, the windows wide, and the coloring of the inside cheerful and attractive. The equipment is simple, but fulfills every requirement of modern science.

Differing from the last example, where the grounds were more or less restricted, the *Benjamin Stickney Cable Memorial Hospital* (Figs. 294-298), in Ipswich, Mass., is erected in the center of a ten-acre lot. (See Chapter XIX on landscape architecture). The ample space around the building, coupled with the natural beauty of the site, gives the architect more than usual opportunities for placing the rooms to the best advantage.

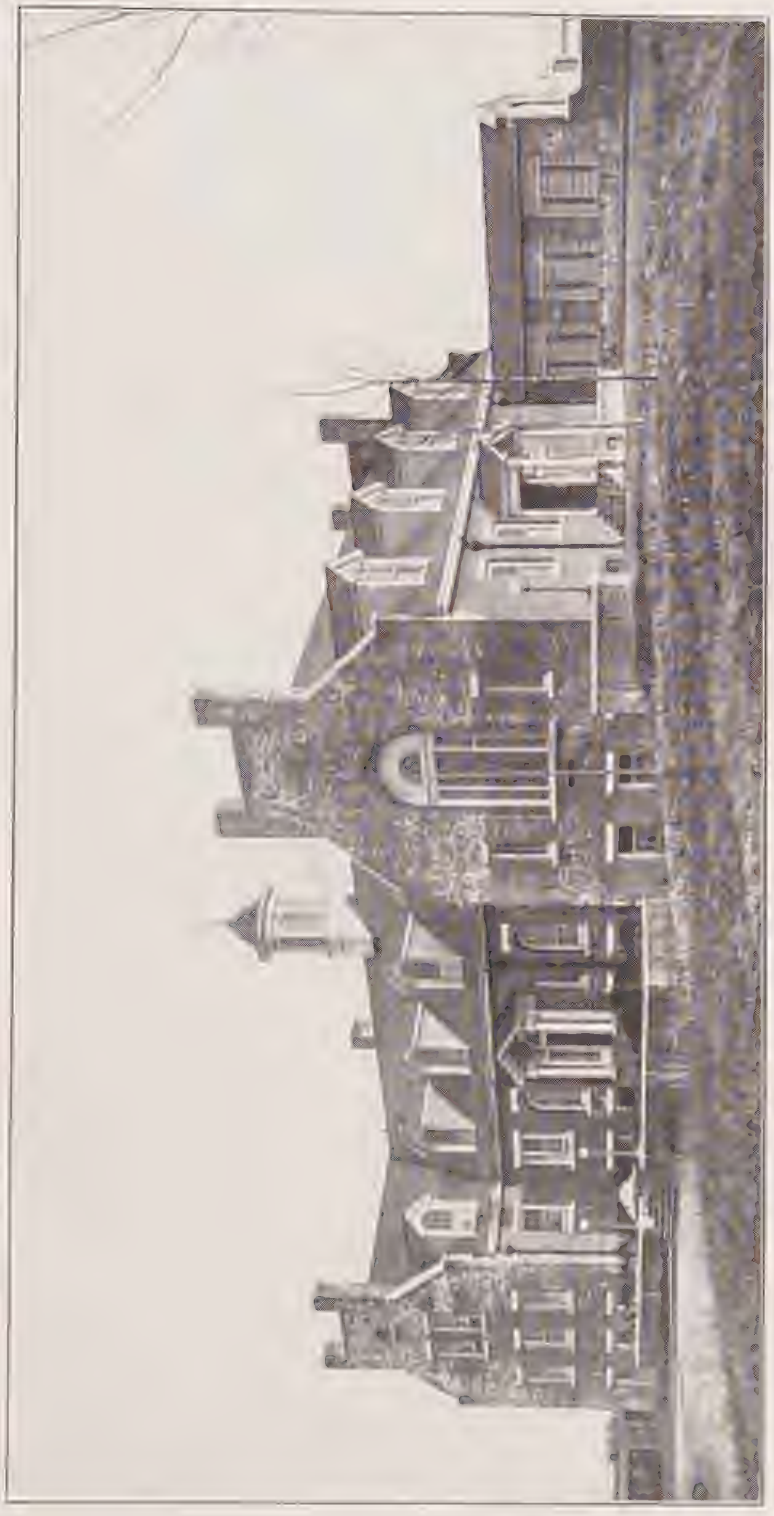


FIG. 297. BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL, IPSWICH, MASS.

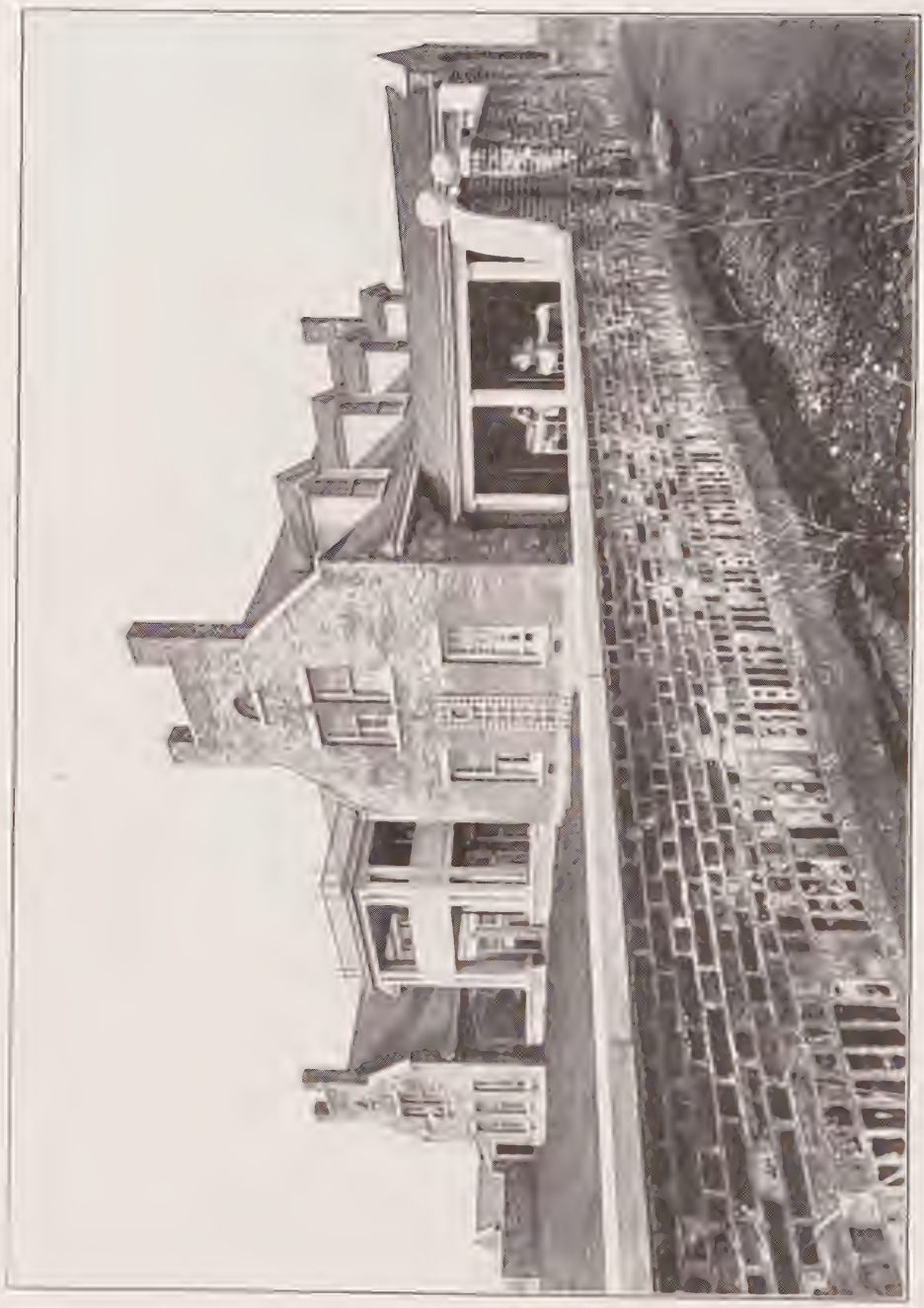


FIG. 298. BENJAMIN STICKNEY CABOT MEMORIAL HOSPITAL, IPSWICH, MASS.
SOUTH BALCONIES.
Edmund F. Stevens, Architect.

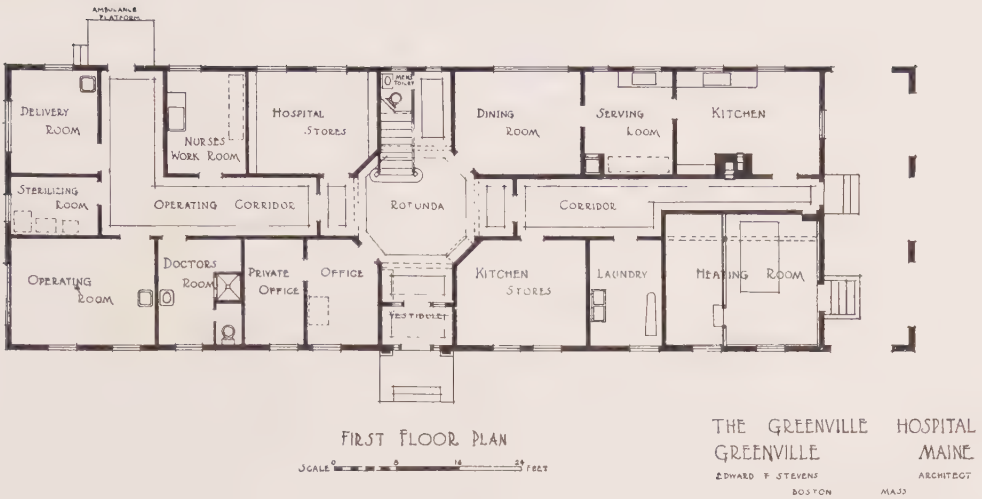


FIG. 299.

The building faces the north, or toward the town proper, but practically all the rooms for patients are on the south, overlooking the beautiful valleys and hills in that direction.

The building, of fireproof materials, is designed in the early Georgian style so common in the old New England towns. It accommodates twenty patients on the first floor, and the second floor is also available for use of patients.

The ground floor contains the kichen, dining-rooms, X-ray, morgue, heating, and storage rooms; for the present, the second story is set apart for nurses and for a small isolation department.

To give assurance of security, a low brick wall is built around the patients' court, upon which three airing balconies open. These airing balconies, projecting to the east and west, cut off the cold winds from the north and east.

The plan is simple: one enters through the memorial entrance, which is finished in Colonial detail, passes up two steps to the main corridor and thence into

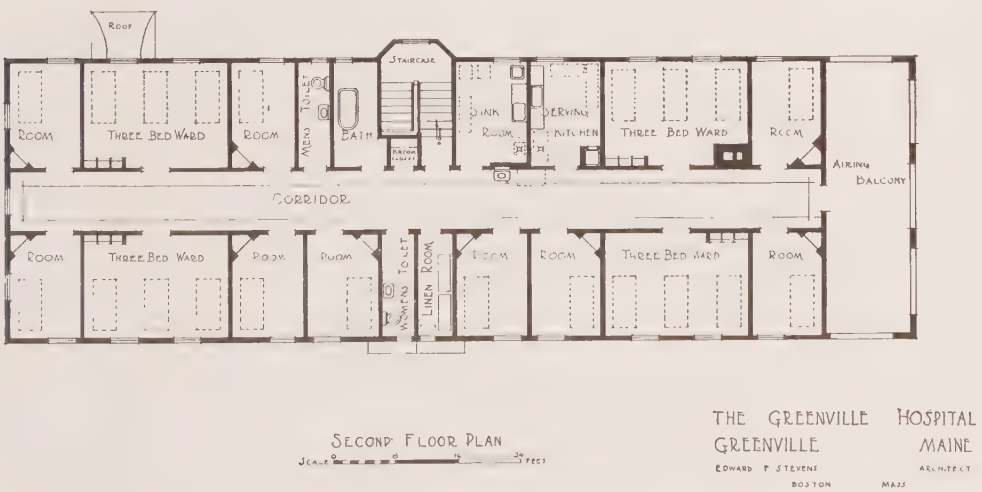


FIG. 300.

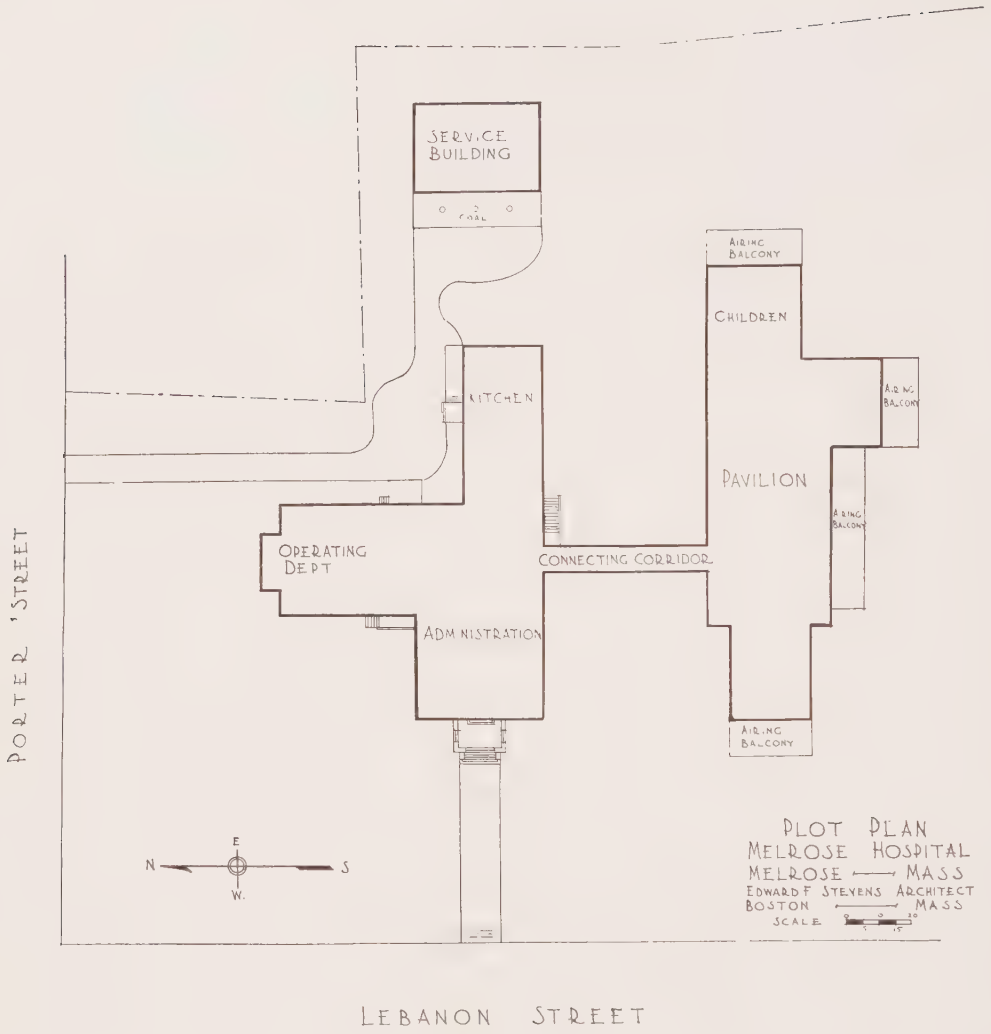


FIG. 301.

the private patients' day room, or out into the patients' court (Figs. 23 and 32A).

On the east end of the building is located the men's ward, the operating department, and the ambulance entrance; on the west, the women's and maternity wards; on the northeast, the children's ward; on the south are four private rooms; and on the north the utilities.

The small *Greenville Hospital* (Figs. 299, 300), at Greenville, Me., built to meet the needs of the lumber industries of the vicinity, at the figure, approximately, of twenty-five thousand dollars, is, perhaps, as complete as any hospital of a like cost. It is somewhat unduly expensive, but was built in the season of 1916-1917 when all materials were at a maximum.

The problem on the *Melrose Hospital* (Figs. 301-308) at Melrose, Mass., was to build a fifty- to sixty-bed hospital on a noisy street corner, with trolley lines on two streets.

The buildings were set well back from

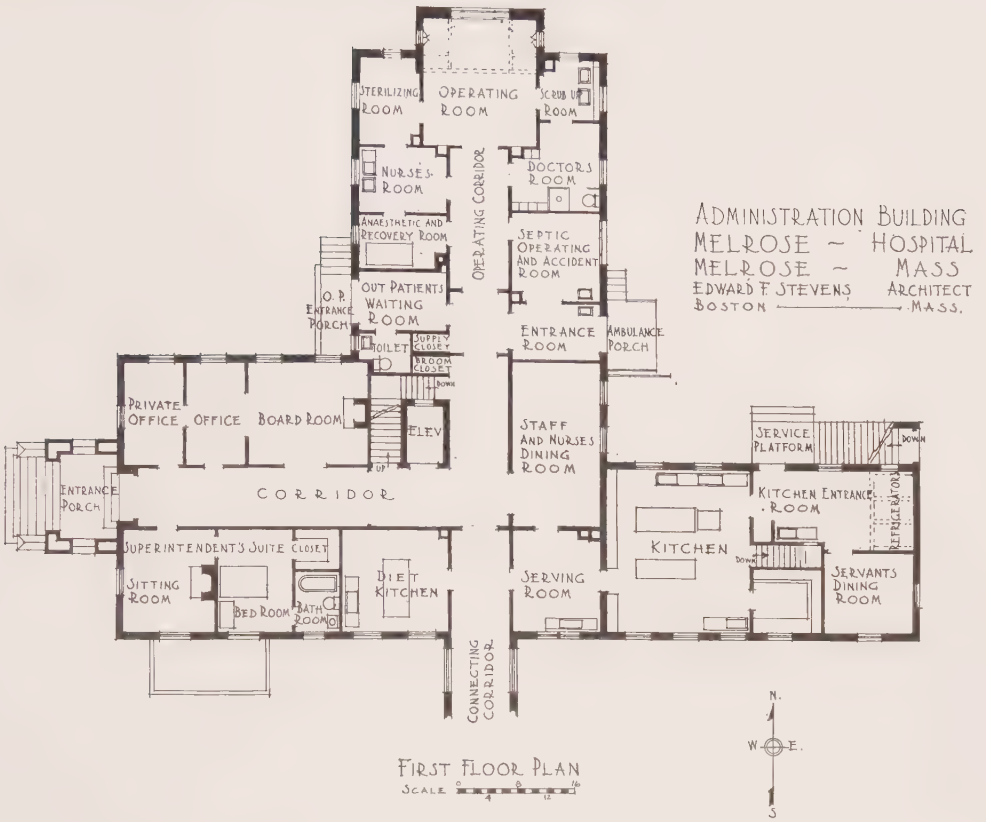


FIG. 302

the street, the operating portion only being near the street, the buildings being so planned as to bring the patients away from the noisy corner. There are three buildings in this group.

In the basement of the *administration building* are the Roentgen-ray and laboratory departments, the pharmacy, store rooms, autopsy and lecture rooms, and rooms for male help. On the first floor are all of the administrative offices, the superintendent's suite, and the operating department.

The second floor, however, is devoted to the care of patients—1st, in private rooms and suites; and 2d, in the maternity department, which consists of a three-bed ward, a delivery room, creche, and wash room—all isolated from the other portions of the hospital.

One serving kitchen serves all patients in this building.

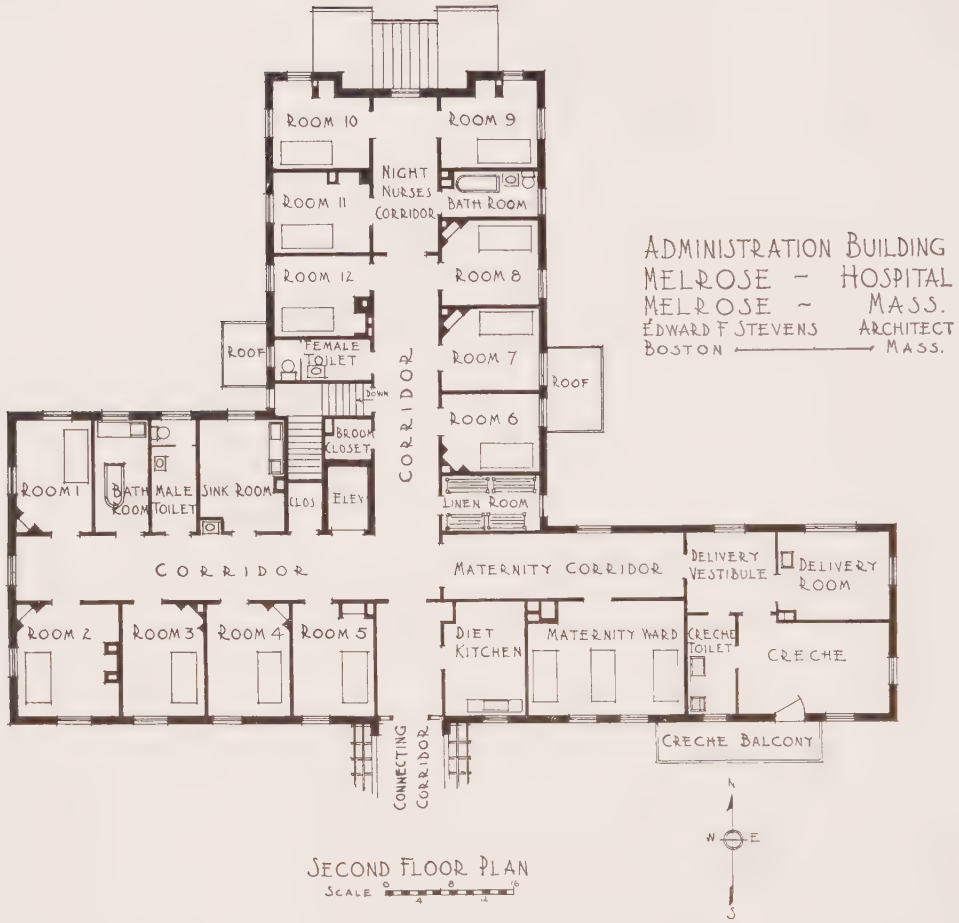
The *ward pavilion* is joined to the administration building by a well-lighted corridor. On the first floor are the three main wards—men's, women's and children's—and five private rooms, and on the second floor are ten private rooms, with the usual service.

All of the wards and private rooms on the first floor open directly onto airing balconies, which are so separated that the patients on one balcony are not visible to those on another.

On the second story a large roof ward has been provided for the treatment of pneumonia cases, as well as for use by ambulatory cases.

The *heating plant* and *laundry* are housed in a separate building, which also affords sleeping accommodations for female servants. The nurses are provided for in an adjoining estate.

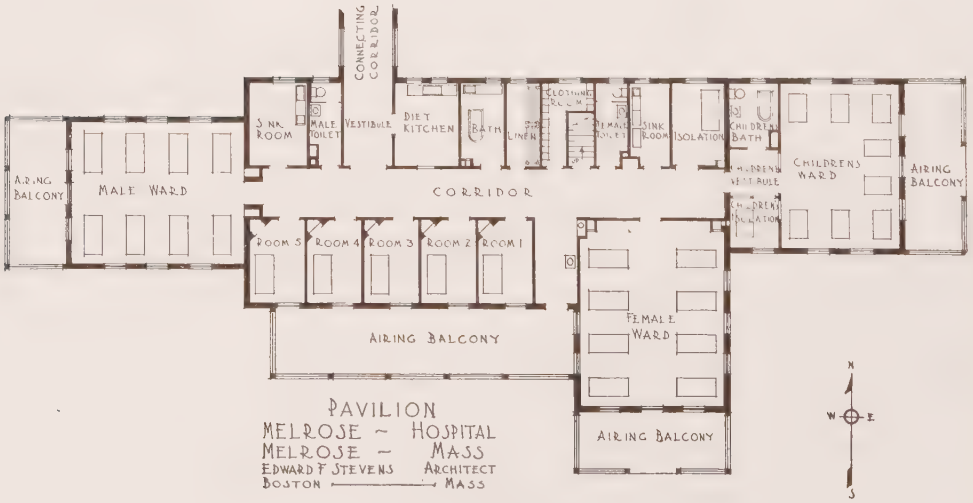
The problem of the *Josiah B. Thomas*



ADMINISTRATION BUILDING
MELROSE - HOSPITAL
MELROSE - MASS.
EDWARD F STEVENS ARCHITECT
BOSTON ——— MASS.

SECOND FLOOR PLAN
SCALE 0 4 8 12 16

FIG. 303.



PAVILION
MELROSE - HOSPITAL
MELROSE - MASS
EDWARD F STEVENS ARCHITECT
BOSTON ——— MASS

FIRST FLOOR PLAN
SCALE 0 4 8 12

FIG. 304.

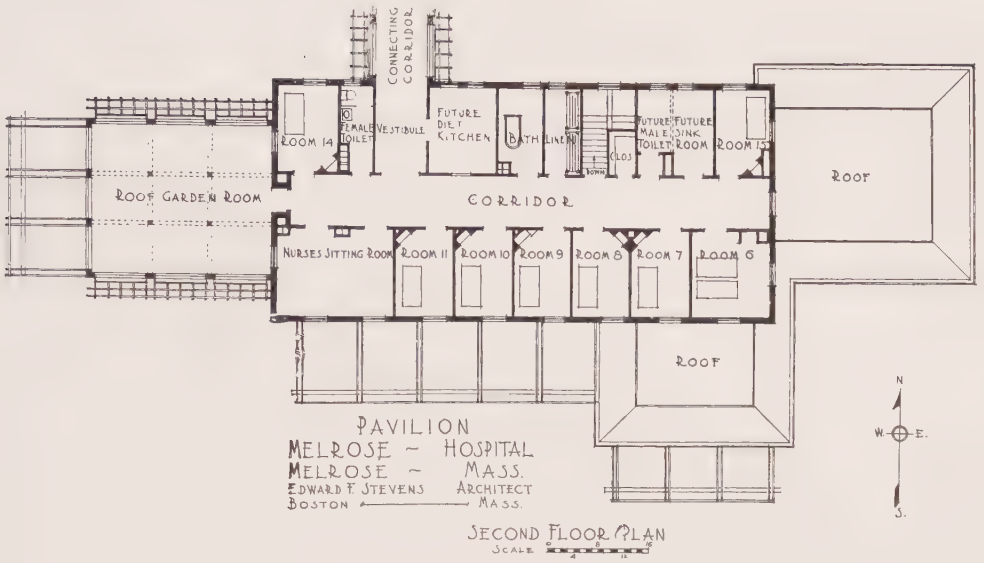


FIG. 305.

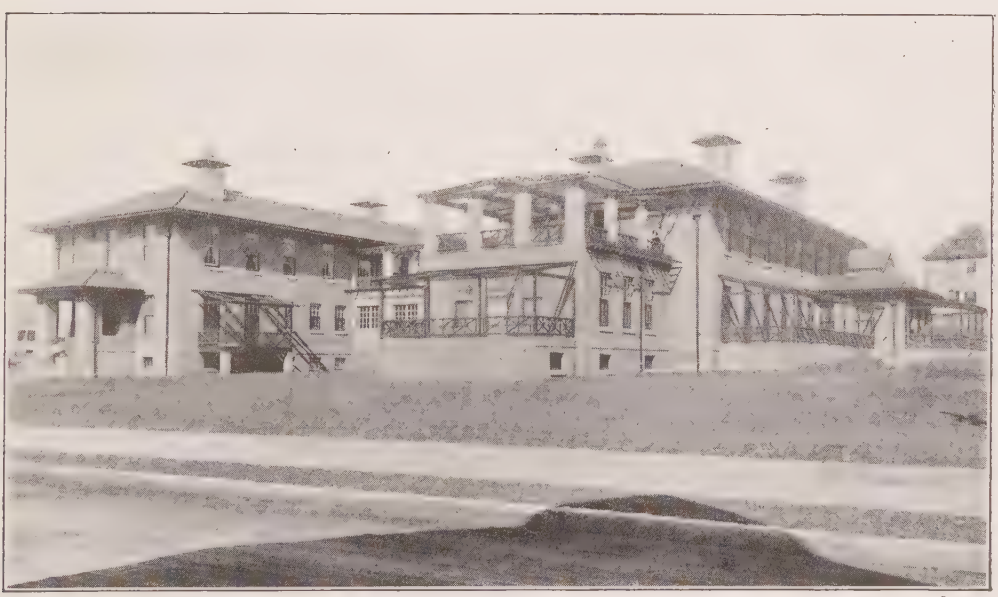


FIG. 306. MELROSE HOSPITAL, MELROSE, MASS. EXTERIOR.
Edward F. Stevens, Architect.

FIG. 307. MELROSE HOSPITAL, MELROSE, MASS. OPEN AIR CORRIDOR.
Edward F. Stevens, Architect.

Hospital (Figs. 309, 310), at Peabody, Mass., was different. The land sloped to the north, making that exposure the important one to study. The operating room window was made the architectural feature. Otherwise the building is a simple treatment of the small hospital problem. A very complete outpatient department was secured under the surgical end of the building.

As in the case of Dr. Williams' Sanatarium at Macon, the *Mason Hospital* (Figs. 312, 313), at Clarksburg, W. Va., was mainly for the private practice of the founder.

The hospital is built on a somewhat restricted site.

The plans are self-explanatory. Provision is made for a rather extensive out-patient department in connection with the X-ray and laboratory. The operating department is set apart from the administration, and is reached either from the ambulance entrance at the rear or through the main entrance at the front.

This small fireproof hospital is self-contained, housing all departments except the nurses.

The *Yonkers Homeopathic Hospital,* Yonkers, N. Y. (Figs. 317, 318, 319), includes wards and private rooms, a large maternity department, operating department, kitchen, dining-rooms, and temporary housing for domestics.

The *Good Samaritan Hospital,* Sandusky, Ohio (Figs. 320, 321, 322), is a very complete small hospital. On the ground floor are the laboratory, X-ray, medical treatment rooms, isolation rooms, kitchen and dining-rooms. On the first floor is the administration department, well separated from the wards for men, women and children. On the second floor are the operating rooms, grouped about a rotunda, a small maternity department, and sixteen private rooms. Good balconies are provided for each floor.

No more fitting *memorial* could be erected to the men who fought in the world war than a hospital building. The public-spirited citizens of Penn Yan, N. Y., chose this form of expression for their gratitude. The *Soldiers' and Sailors' Memorial Hospital* (Figs. 323, 324, 325), set in a beautiful park, has for its entrance a memorial hall. Its walls will have bronze tablets set into the panel-

FIG. 308. MELROSE HOSPITAL, MELROSE, MASS. PRIVATE ROOM.

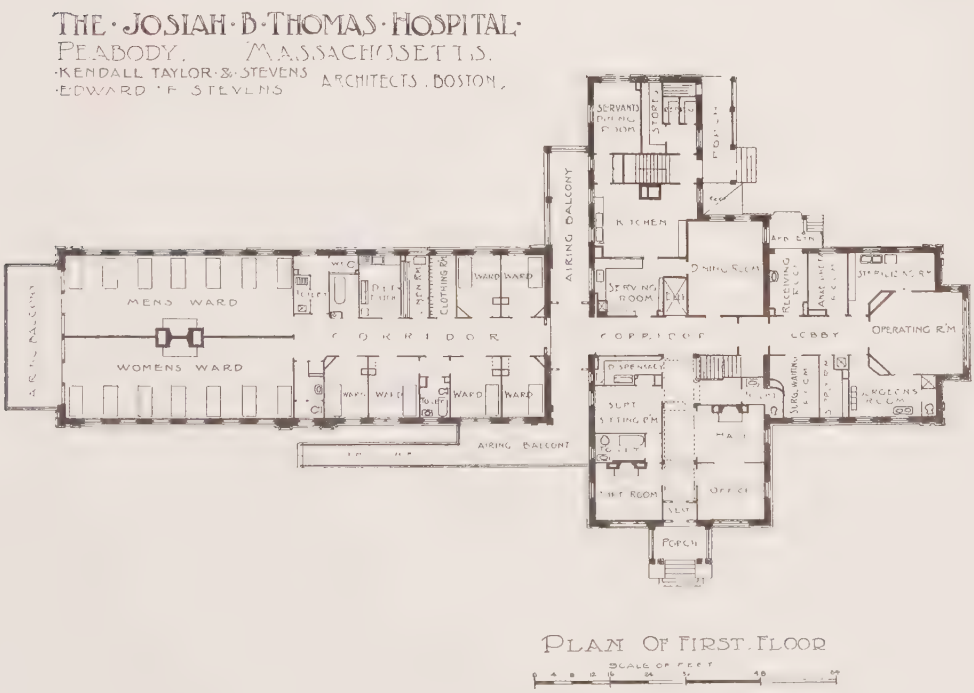


FIG. 309.

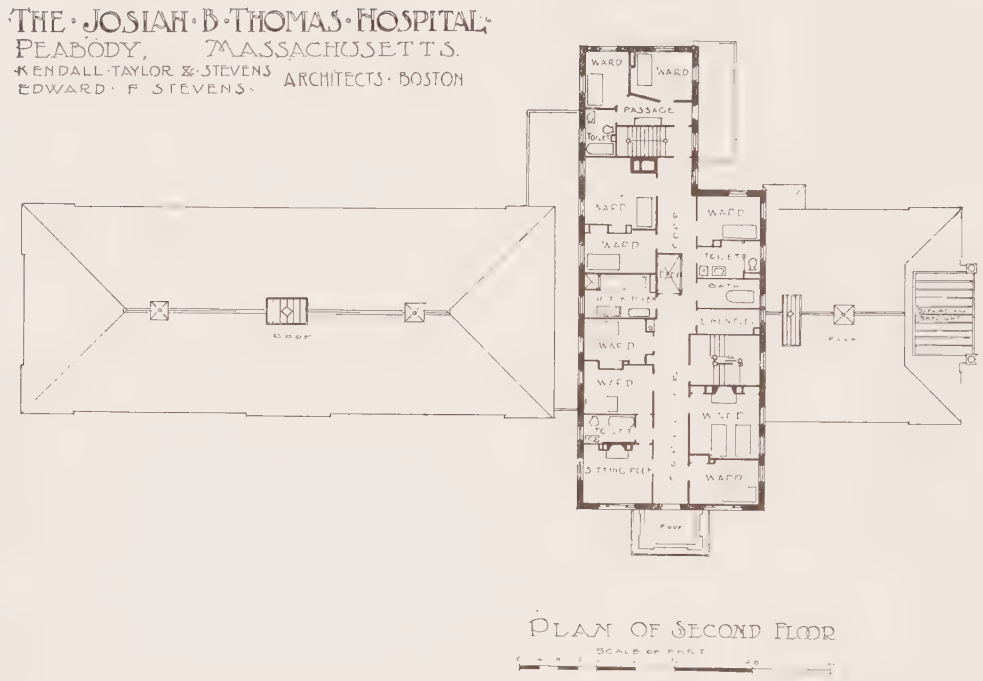


FIG. 310.

FIG. 311. JOSIAH B. THOMAS HOSPITAL, PEABODY, MASS.
Kendall, Taylor & Stevens and Edwards F. Stevens, Architects.

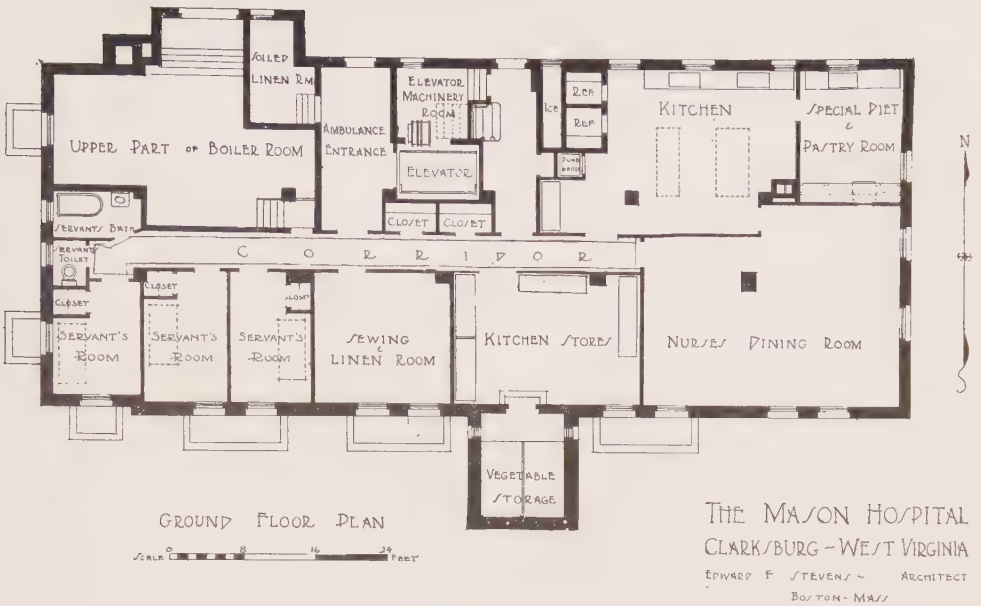


FIG. 312

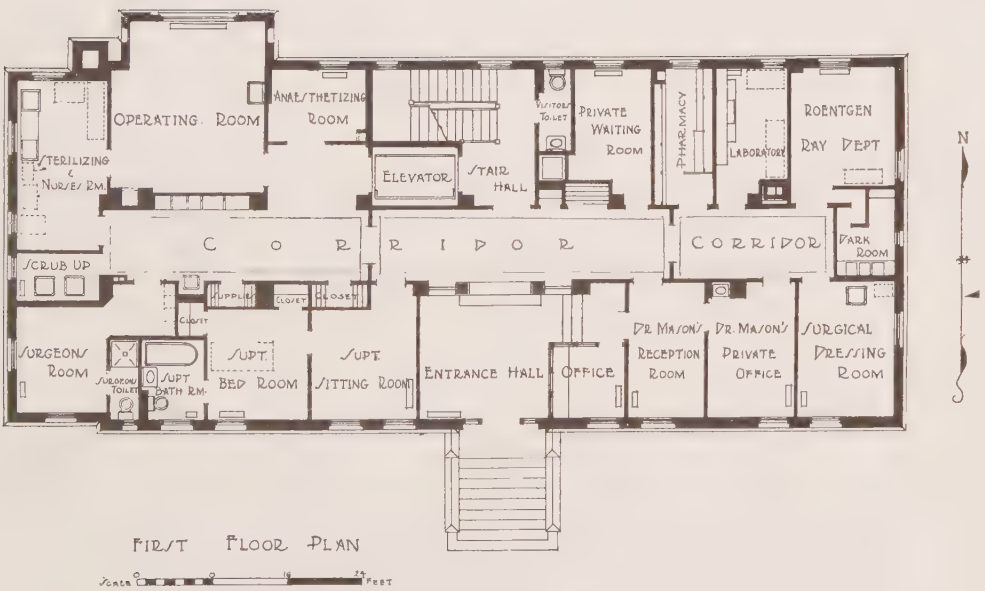


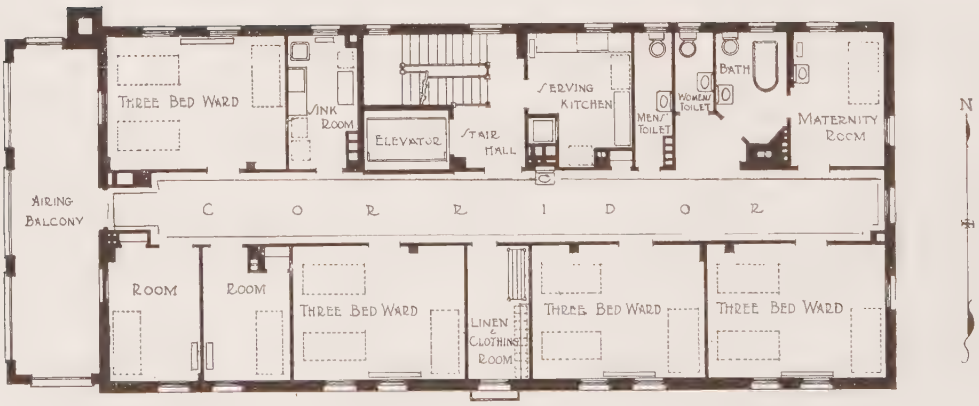
FIG. 313. MASON HOSPITAL, CLARKSBURG, W. VA.
Edward F. Stevens, Architect.

SECOND & THIRD FLOOR PLANS

SCALE 0 8 16 24 FEET

THE MASON HOSPITAL
CLARKSBURG - WEST VIRGINIA
EDWARD F STEVENS — ARCHITECT
BOSTON - MASS

FIG. 314.



FOURTH FLOOR PLAN

SCALE 0 8 16 24 FEET

THE MASON HOSPITAL
CLARKSBURG - WEST VIRGINIA
EDWARD F STEVENS — ARCHITECT

FIG. 315.

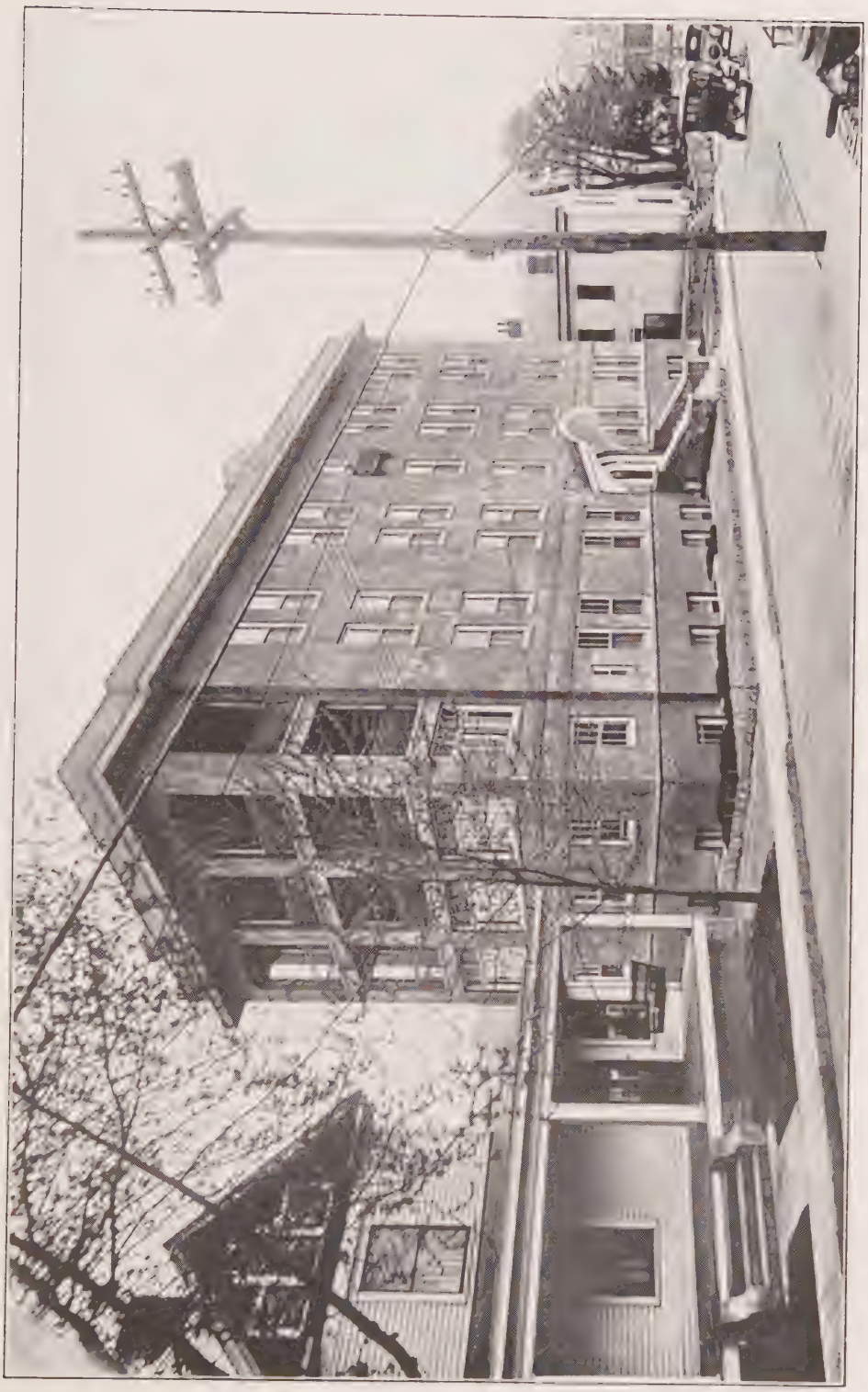
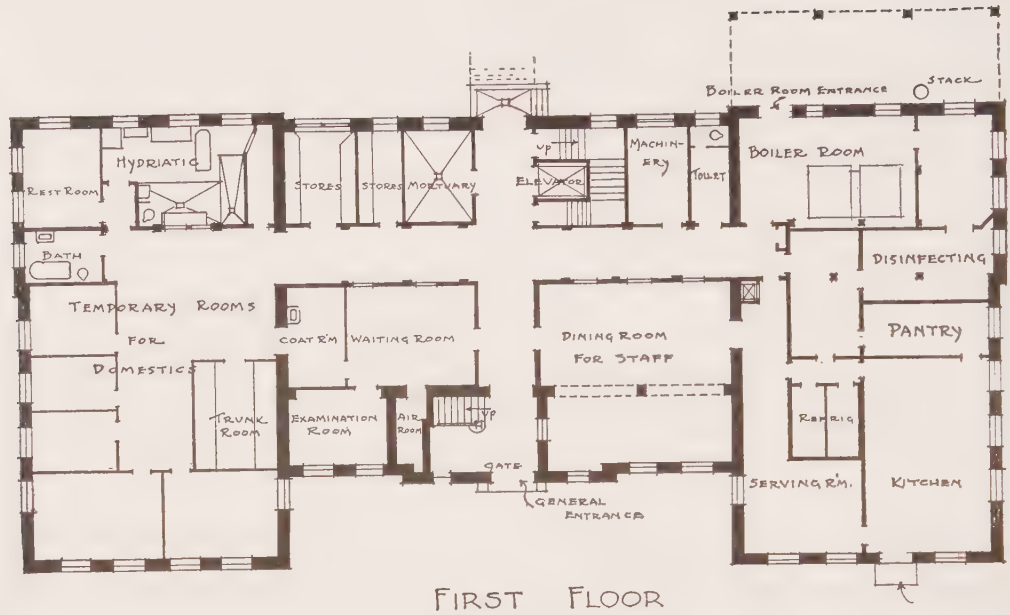
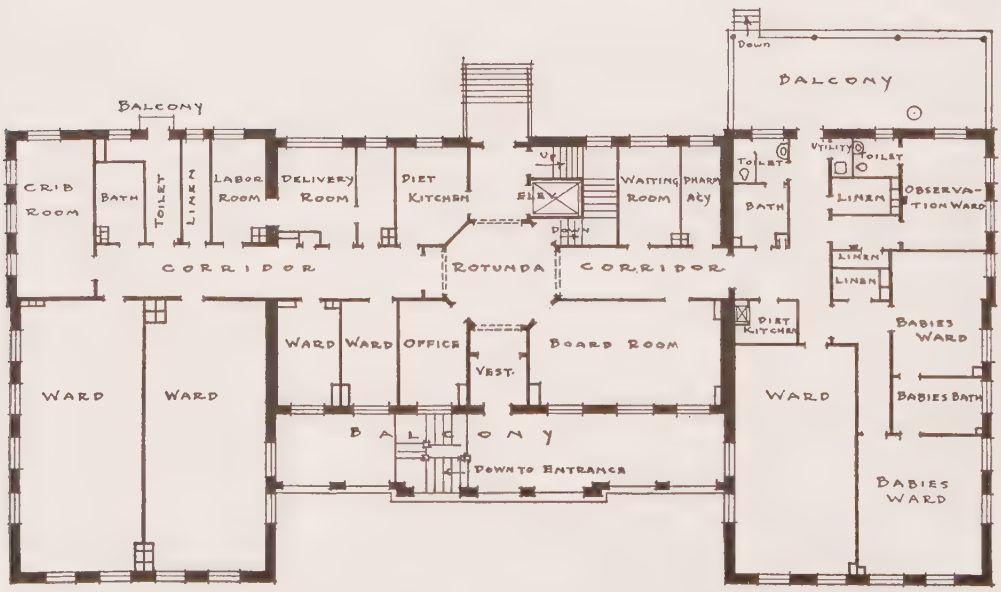


FIG. 316. THE MASON HOSPITAL, CLARKSBURG, W. VA.
Edward F. Stevens, Architect.



FIRST FLOOR



SECOND FLOOR

FIG. 317. YONKERS HOMEOPATHIC HOSPITAL, YONKERS, N. Y.
Kendall, Taylor & Stevens, Architects.

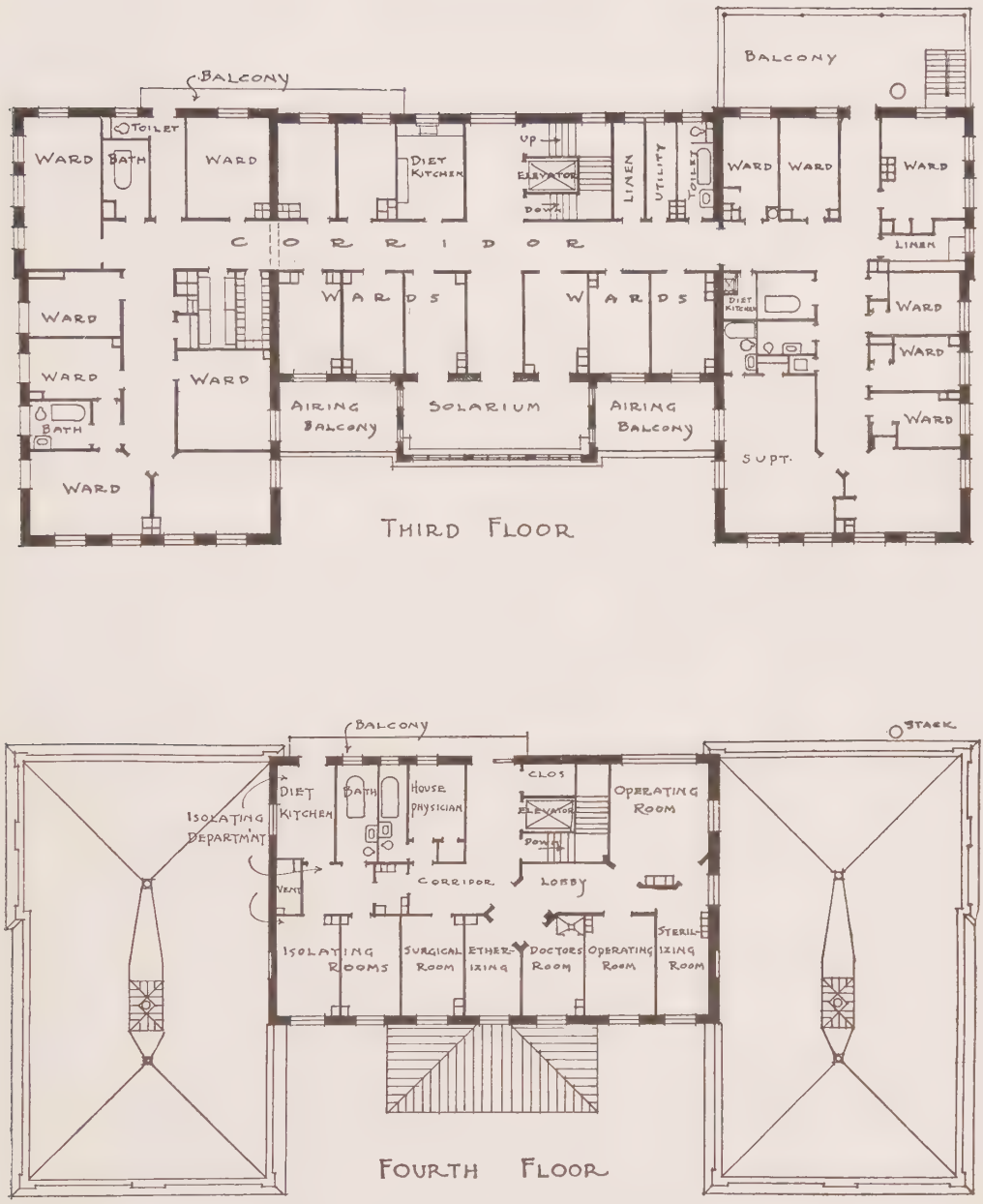
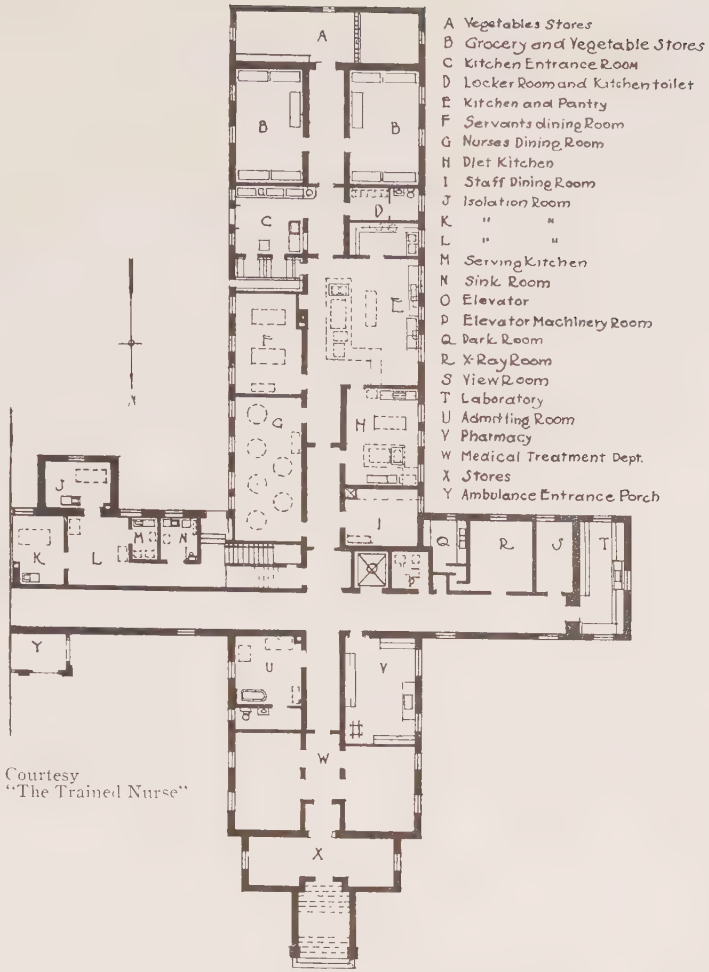


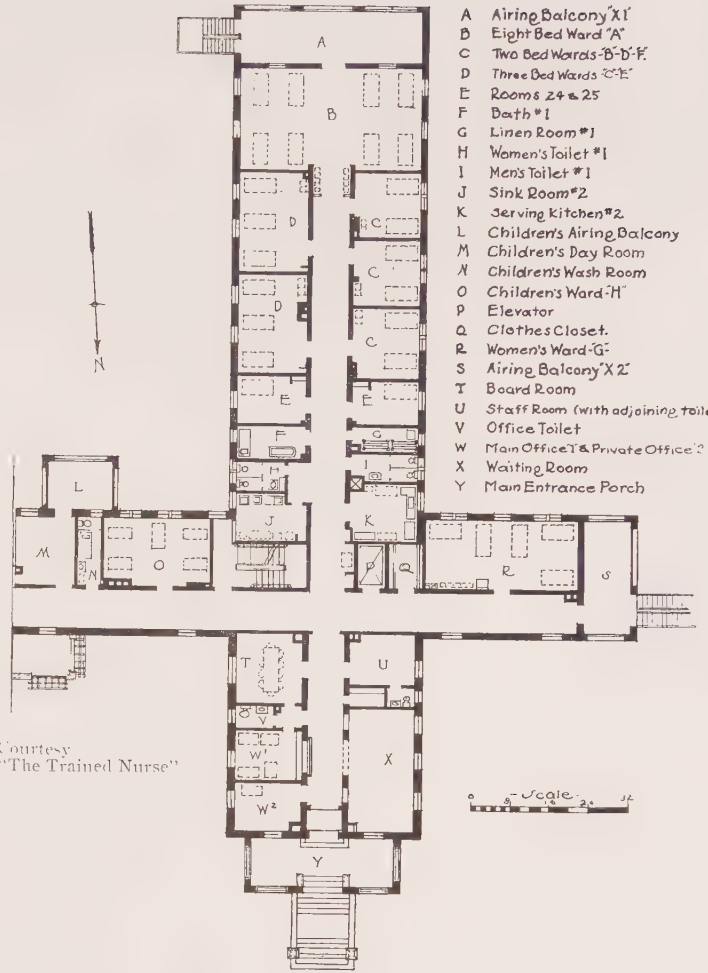
FIG. 318. YONKERS HOMEOPATHIC HOSPITAL, YONKERS, N. Y.
Kendall, Taylor & Stevens, Architects.

FIG. 319. YONKERS HOMEOPATHIC HOSPITAL, YONKERS, N. Y.
Architects.



Courtesy
"The Trained Nurse"

FIG. 320. GOOD SAMARITAN HOSPITAL, SANDUSKY, O.
GROUND FLOOR.



Courtesy
"The Trained Nurse"

FIG. 321. GOOD SAMARITAN HOSPITAL, SANDUSKY, O.
FIRST FLOOR.

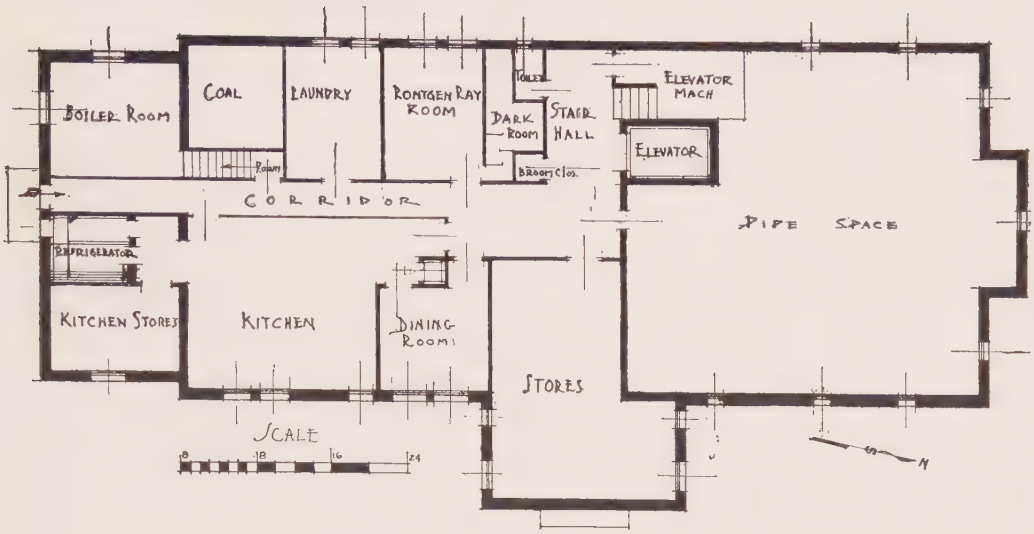
Edward F. Stevens, Architect.

FIG. 322. GOOD SAMARITAN HOSPITAL, SANDUSKY, O. SECOND FLOOR.
Edward F. Stevens, Architect.

ling, bearing the names of 650 soldiers and marines who served in the war. There will be cabinets for war relics, etc. From this hall, one enters the hospital office and staff room, which are cut off from the hospital proper.

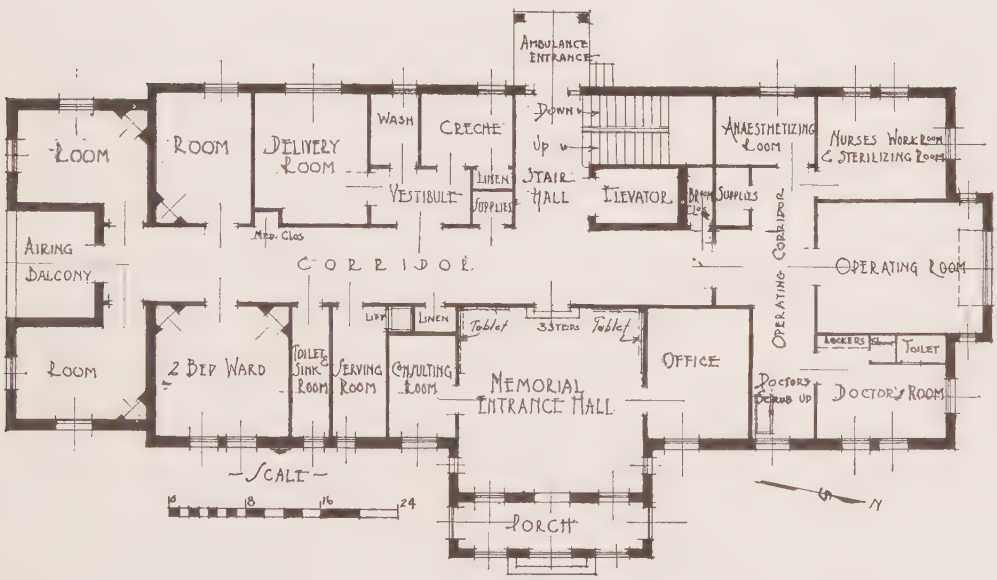
The capacity of the hospital is but eighteen beds. There is a complete operating department on the first floor at the north, the maternity being on the south. The ambulance entrance is at the rear. The contour of the ground gives sufficient height in the basement for kitchen, dining-room and X-ray, as well as the heater and store rooms. On the second floor are four two-bed wards and five private rooms, with ample utilities and large balconies. The building is so arranged that future additions can be easily made.

The *Wallace Thomson Hospital,* Union, S. C. (Figs. 326, 327, 328), is on a commanding site, sunny, away from business and traffic. The exterior is in southern colonial style, of red brick, with white trimmings and a red tile roof. The first floor is devoted to the administrative and surgical departments, the second being reserved for patients. The operating and X-ray departments are quite com-



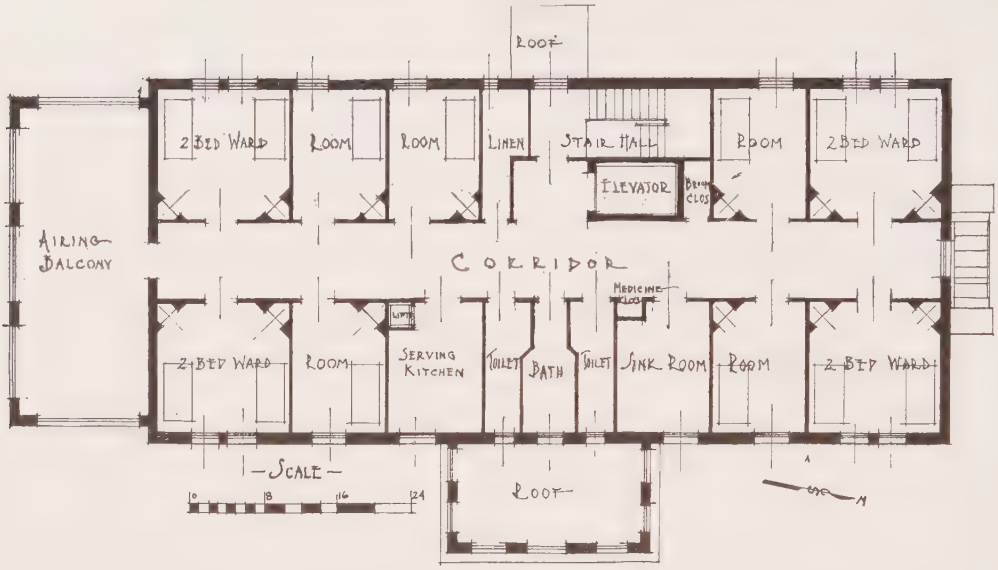
Courtesy "Architectural Record."

FIG. 323. SOLDIERS' AND SAILORS' MEMORIAL HOSPITAL, PENN YAN, N. Y. BASEMENT.
Edward F. Stevens, Architect.



Courtesy "Architectural Record."

FIG. 324. SOLDIERS' AND SAILORS' MEMORIAL HOSPITAL, PENN YAN, N. Y. FIRST FLOOR.
Edward F. Stevens, Architect.

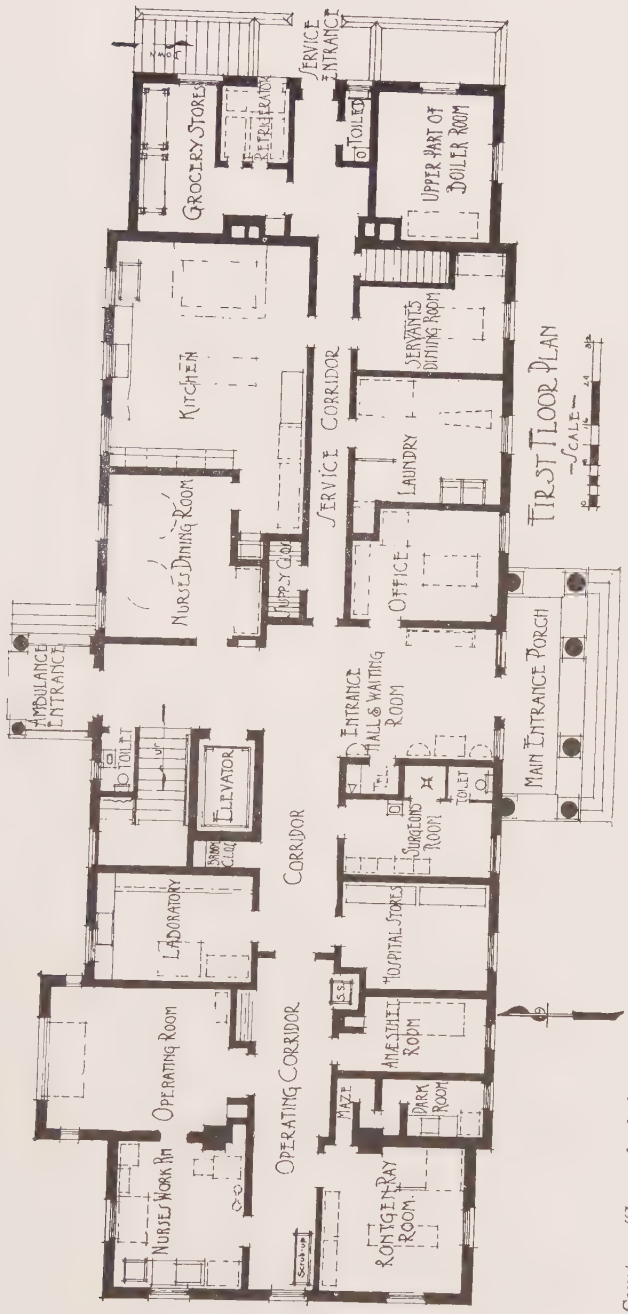


Courtesy "Architectural Record."

FIG. 324A. SOLDIERS' AND SAILORS' MEMORIAL HOSPITAL, PENN YAN, N. Y. SECOND FLOOR.
Edward F. Stevens, Architect.

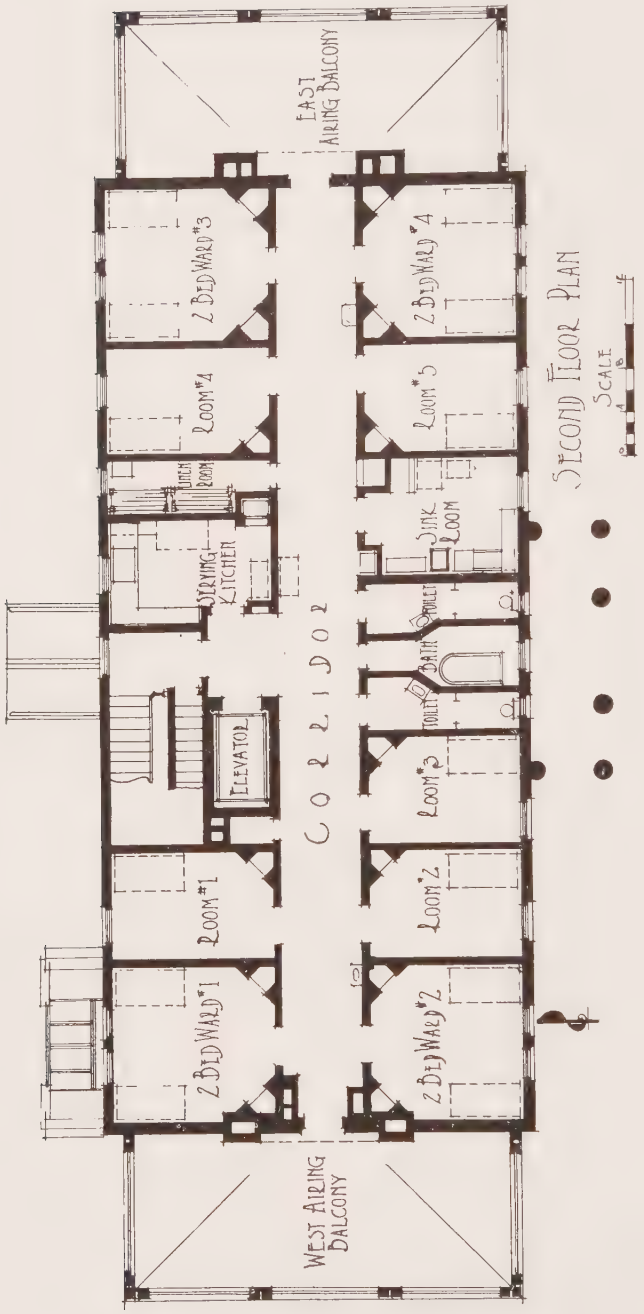
Courtesy "Architectural Record."

FIG. 325. SOLDIERS' AND SAILORS' MEMORIAL HOSPITAL, PENN YAN, N. Y.
Edward F. Stevens, Architect.



Courtesy "Journal of the American Medical Association."

FIG. 326. THE WALLACE THOMSON HOSPITAL, UNION, S. C. FIRST FLOOR.
Edward F. Stevens, Architect.



Courtesy "Journal of the American Medical Association."

FIG. 327. THE WALLACE THOMSON HOSPITAL, UNION, S. C. SECOND FLOOR.
Edward F. Stevens, Architect.

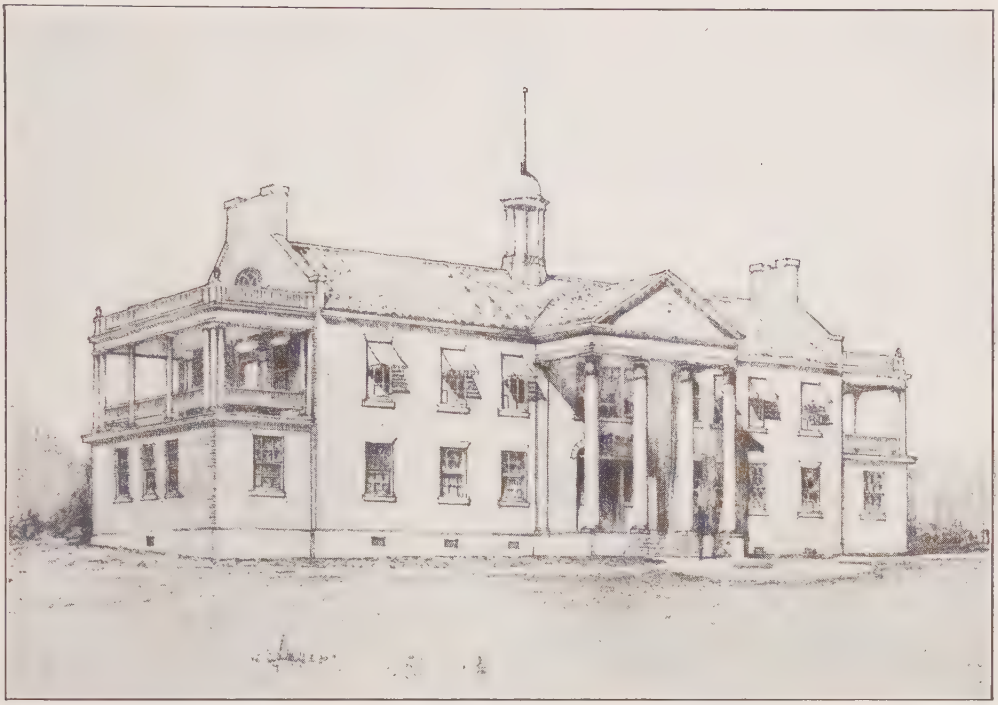


FIG. 328. WALLACE THOMSON HOSPITAL, UNION, S. C.
Edward F. Stevens, Architect.

plete; the staff room is used as a surgeons' dressing room. The kitchen, dining rooms, laundry, etc., are shut off from the entrance and the office. The ambulance entrance is close to the elevator and staircase. On the second floor are two-bed wards, private rooms, central utilities, and good balconies. The placing of parts with relation to each other in so small a building is an interesting study.

CHAPTER XIV.

The Nurses' Residence

Perhaps next in importance to the care of the patient is the care of the nurse, for to do her best and give comfort and help to the sick a nurse must conserve her own health and strength. When off duty she must be able to go out of the environment of the sick room, out of the sound of suffering, out of the smell of iodiform, and in fact out of the hospital atmosphere.

Any hospital of considerable size should have its nurses' residence. This should be a *separate building,* not too remote from the hospital, but far enough away so that the noises of an entertainment, a dancing party or a romp will not disturb the patients.

The more attractive and homelike this building can be made and the more alluring it can be made to the young woman who is taking up nursing, the better will be the class of women who will come to it and, in the end, the better will be the care that the patient will receive.

No matter how small the appropriation for a nurses' home, one should plan for nothing but single rooms. The nurse's work on duty is most exacting, and every nurse, whether pupil or graduate, should

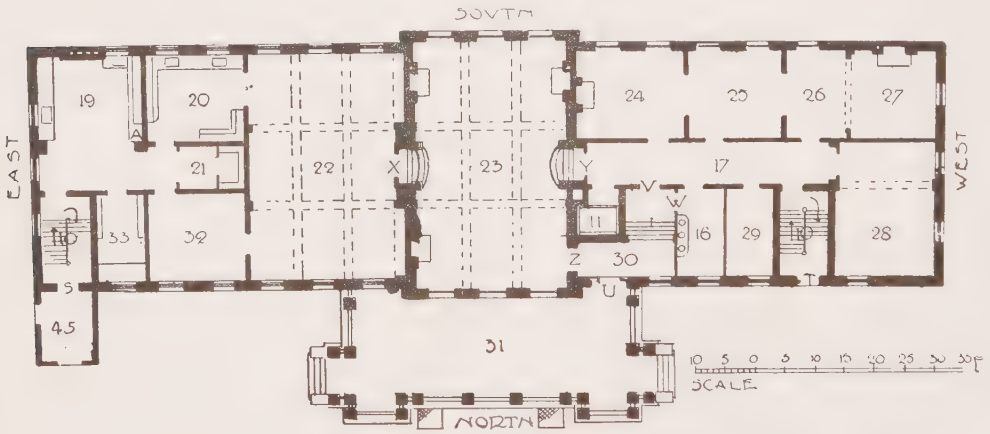


FIG. 329. NURSES' RESIDENCE, HOSPITAL FOR SICK CHILDREN, TORONTO, CANADA. GROUND FLOOR.

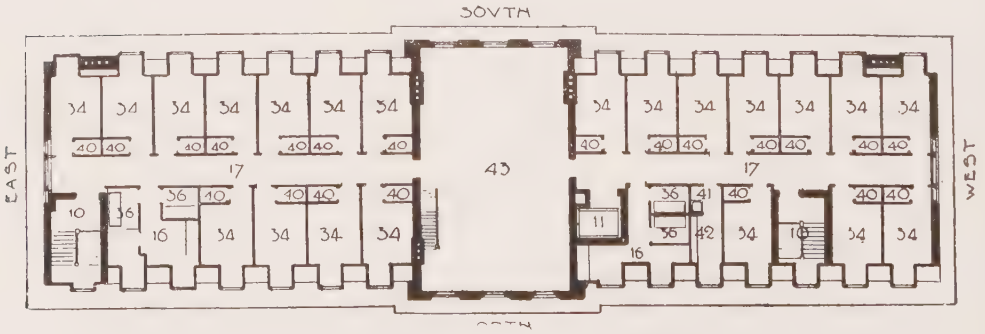
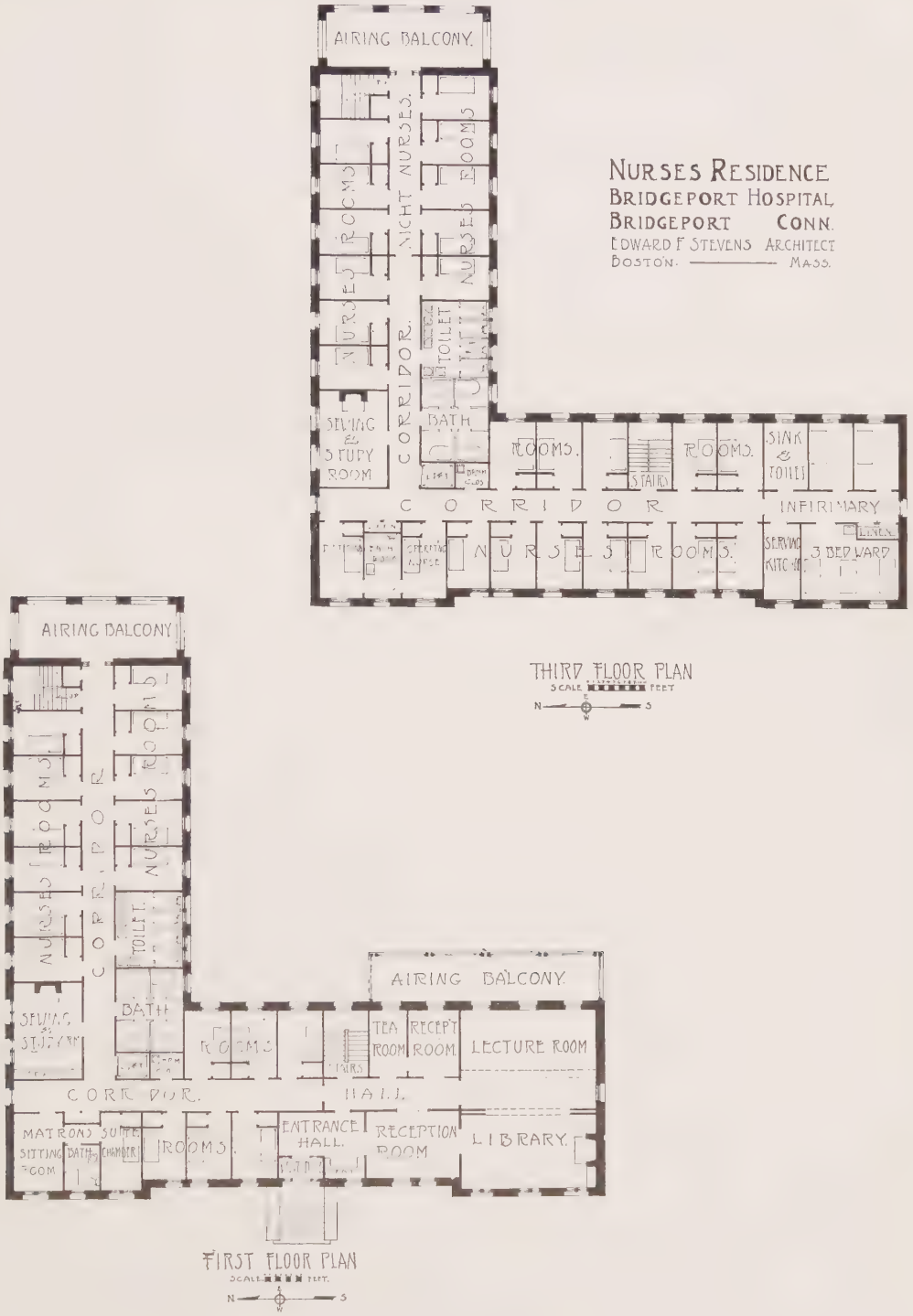


FIG. 330. NURSES' RESIDENCE, HOSPITAL FOR SICK CHILDREN, TORONTO, CANADA. FIRST FLOOR.



NURSES RESIDENCE
BRIDGEPORT HOSPITAL
BRIDGEPORT CONN.
EDWARD F STEVENS ARCHITECT
BOSTON. ——— MASS.

FIG. 331.

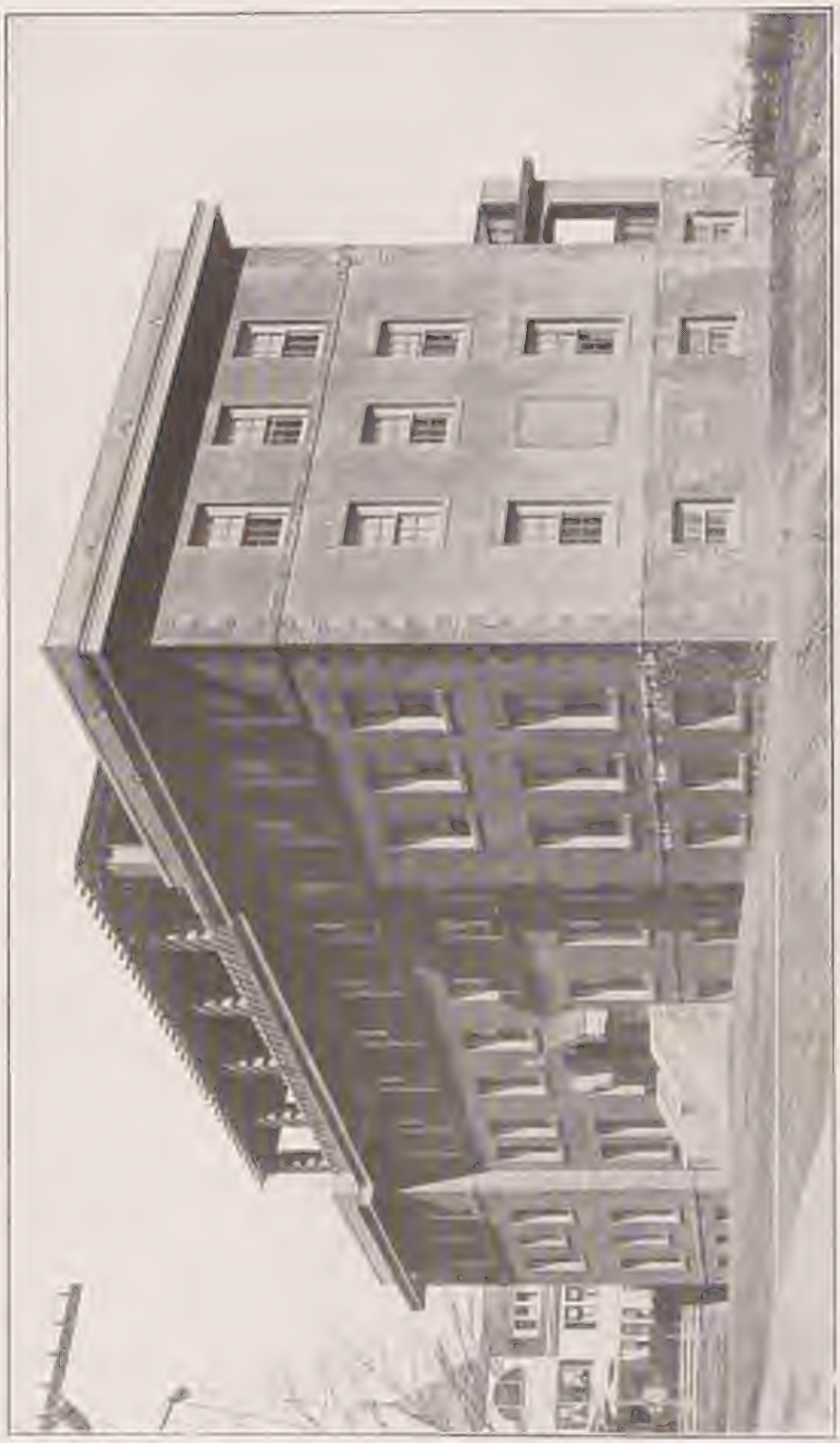


FIG. 332. NURSES' RESIDENCE, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.

FIG. 333. NURSES' RESIDENCE, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN. VIEW FROM REAR.

FIG. 334. STUDY ROOM, NURSES' RESIDENCE, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.

FIG. 335. SUPERINTENDENT'S SITTING ROOM, NURSES' RESIDENCE, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.

have her *own separate room.* It need not be large, only enough for a single bed, closet, dresser, and study desk. These can be fitted into an area 8 ft.-6 in. by 12 ft.-0 in. This is small enough so that two beds or cots cannot be put in. If a larger room is provided, it means that the time will come when the rooms will be made to accommodate two nurses, and the original idea of privacy will be destroyed. The closet should be large and, if possible, lighted by a window. An adjustable electric drop light can be made to serve both for study and toilet light. This is the minimum amount of light, and of course can be increased to any extent.

The living room should be homelike and refined. It should have fireplace, settle seats, and cozy corners. There should be a number of reception rooms where the nurses may meet their friends, and a sitting or study room on each floor.

There should be a small tea kitchen with gas stove and other conveniences, where the nurses may prepare an occasional "spread" for the refreshments of an evening party.

A large trunk room is necessary, with easily accessible racks for trunks. A petty laundry, equipped with set tubs and ironing boards, should be provided in the basement.

Class rooms for demonstration and class work should be planned for in a well-lighted section of the building. These class rooms should be well equipped for demonstration in all kinds of hospital technique.

There must be ample toilet facilities on each floor—one tub and one water-closet for each five or six nurses, one

FIG. 336. TYPICAL NURSE'S ROOM, NURSES' RESIDENCE, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.

wash basin to every four. There should be both shower and tub baths. If possible, bowls with hot and cold water should be placed in every room. There should be a slop sink and broom closet on each floor.

Space should be set aside for nurses on night duty, preferably in the upper story, away from the noise. These rooms should be on a separate corridor.

An infirmary for sick nurses, fitted as a hospital unit, should be provided in every large home.

There should be a piazza and balconies wherever space and money will permit, preferably on the sunny side. If the roof be flat, arrangement should be made to use it for outdoor sleeping as well as for recreation.

In the larger homes for nurses, it may be desirable to provide a separate kitchen and dining-room in the building. In small institutions it is more economical to place the nurses' dining-room near the main hospital kitchen.

Dr. Donald Mackintosh,* in writing on hospital construction, places the nurses' residence of *Hospital for Sick Children* (Figs. 329, 330), as the best example of convenience, and the plans are reproduced here. It is certainly a model home, with its great reception hall, dining-rooms and kitchen, its swimming pool and gymnasium, its sitting and study rooms, etc.

The nurses' residence at the *Bridgeport (Conn.) Hospital* (Figs. 331-336), planned on the L-shape with provision for the future extension completing the U-form, is built on the adjoining lot to the hospital.

Reception rooms adjoin the entrance, and the social and lecture rooms are connected. The suite of the superintendent

*"Construction, Equipment and Management of a General Hospital." Published by William Hodge & Co., Glasgow.

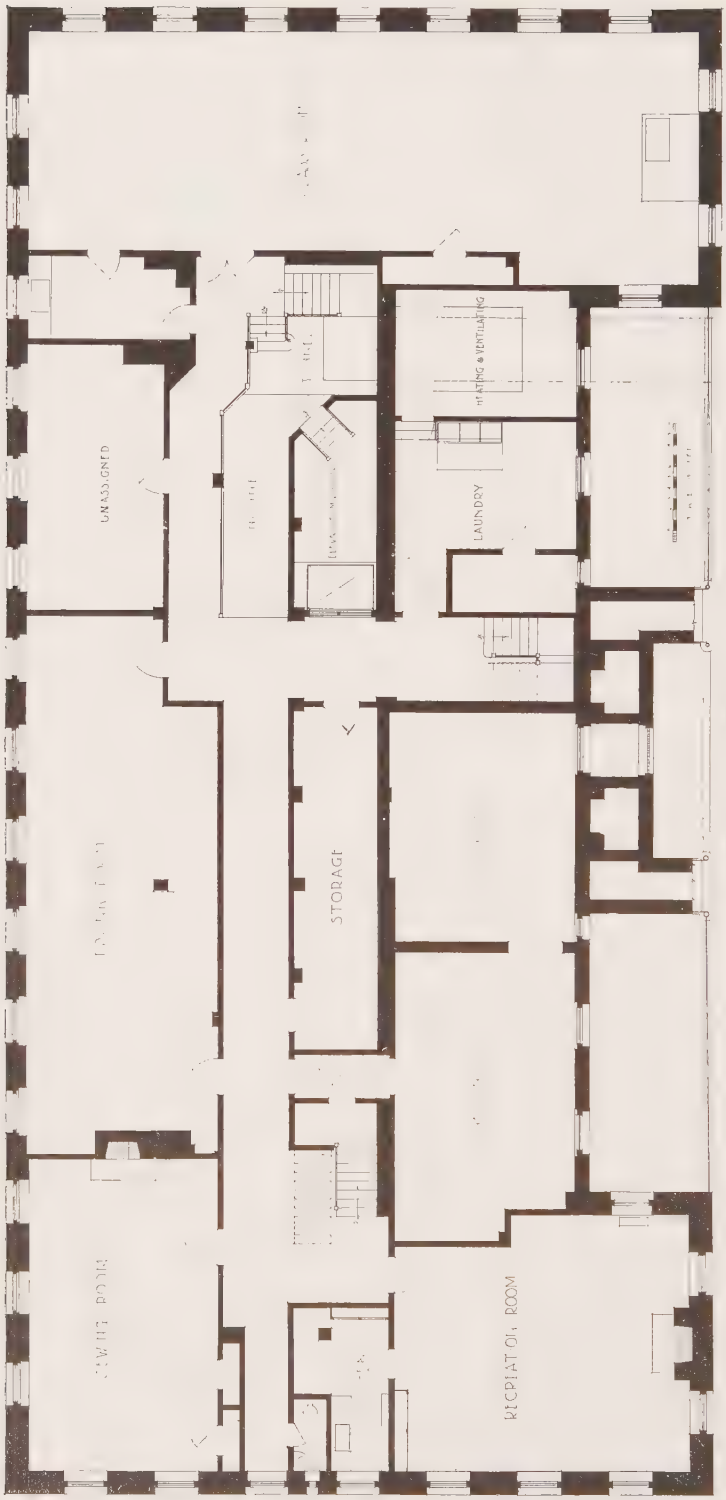


FIG. 37. BASEMENT FLOOR PLAN, NURSES' RESIDENCE—MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.
Coolidge & Shattuck, Architects.

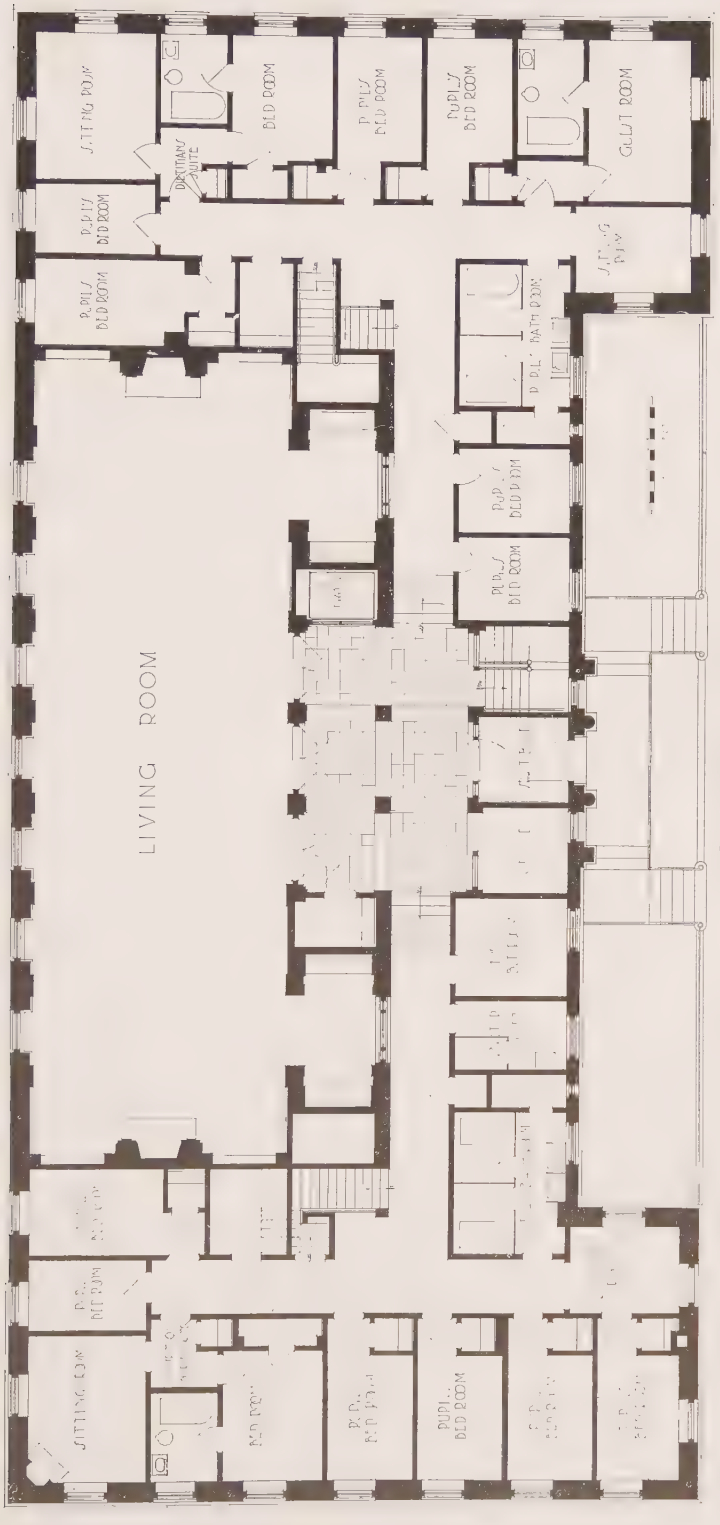


FIG. 338. FIRST FLOOR, NURSES' RESIDENCE—MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.
Coolidge & Shattuck, Architects.

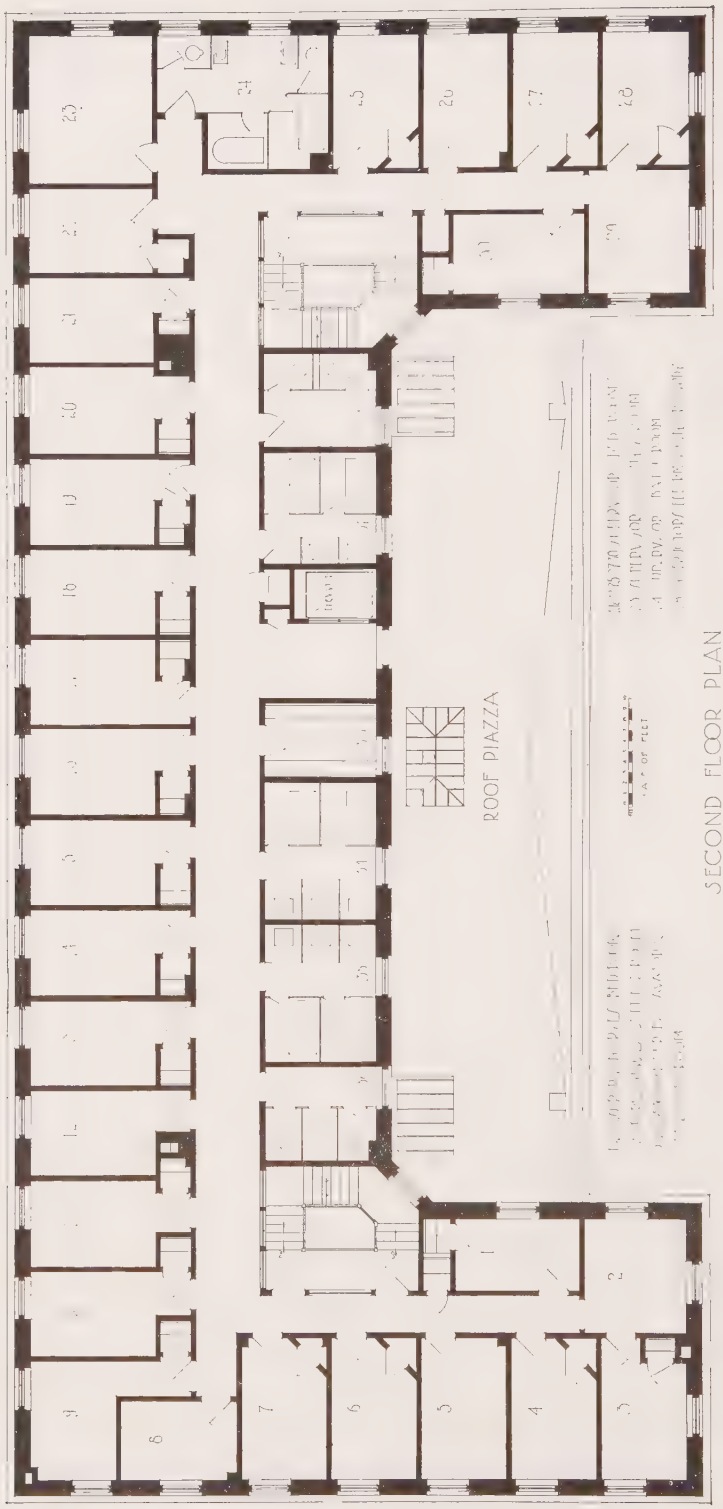


FIG. 339. SECOND FLOOR, NURSES' RESIDENCE—MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASS.
Coolidge & Shattuck, Architects.

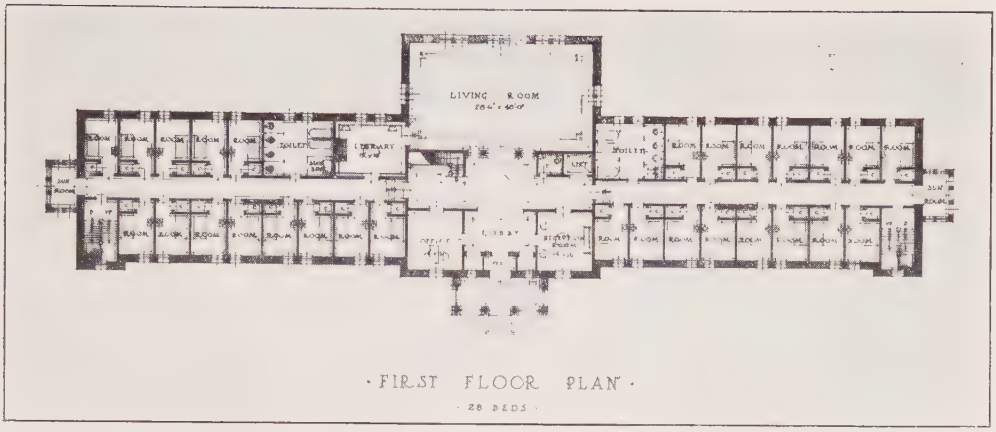


FIG. 340.

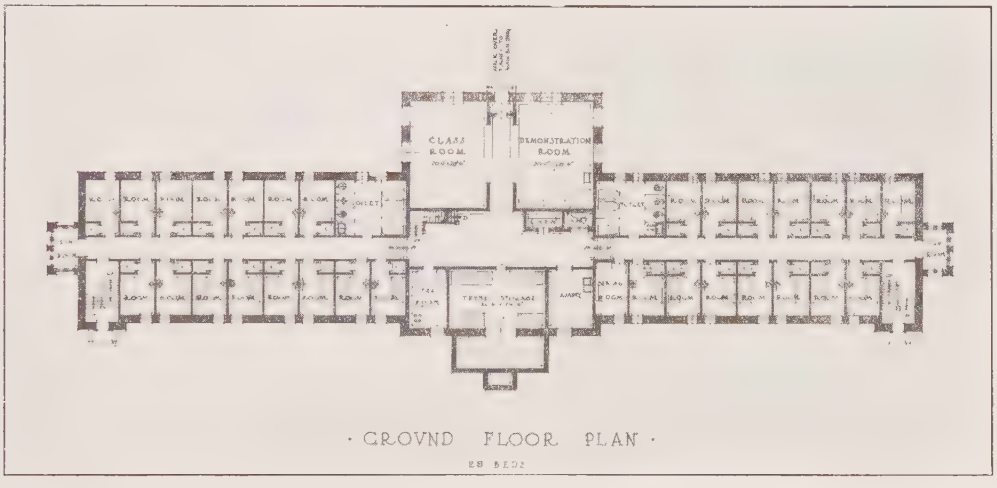


FIG. 341.

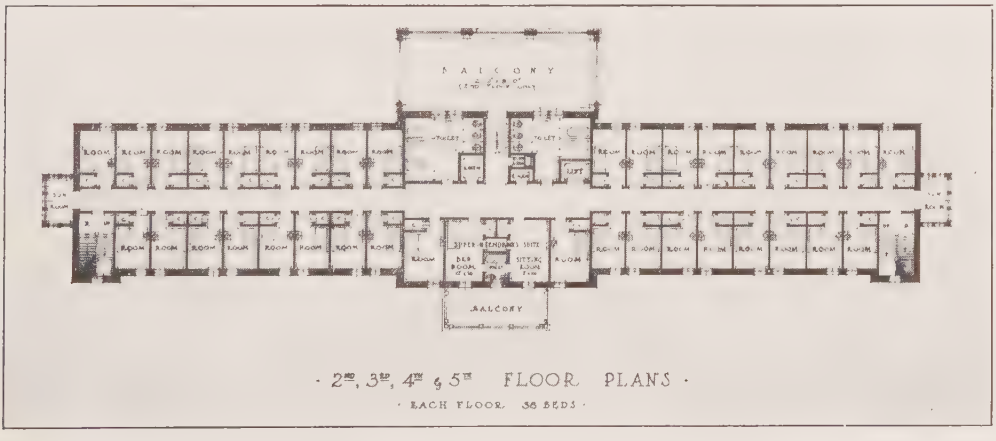


FIG. 342.

NURSES' RESIDENCE, OTTAWA CIVIC HOSPITAL, OTTAWA, CANADA.
Stevens & Lee, Architects.

FIG. 343. FIRST FLOOR PLAN, MASSACHUSETTS STATE INFIRMARY HOME FOR NURSES.
John A. Fox and Curtis W. Bixby, Architects.

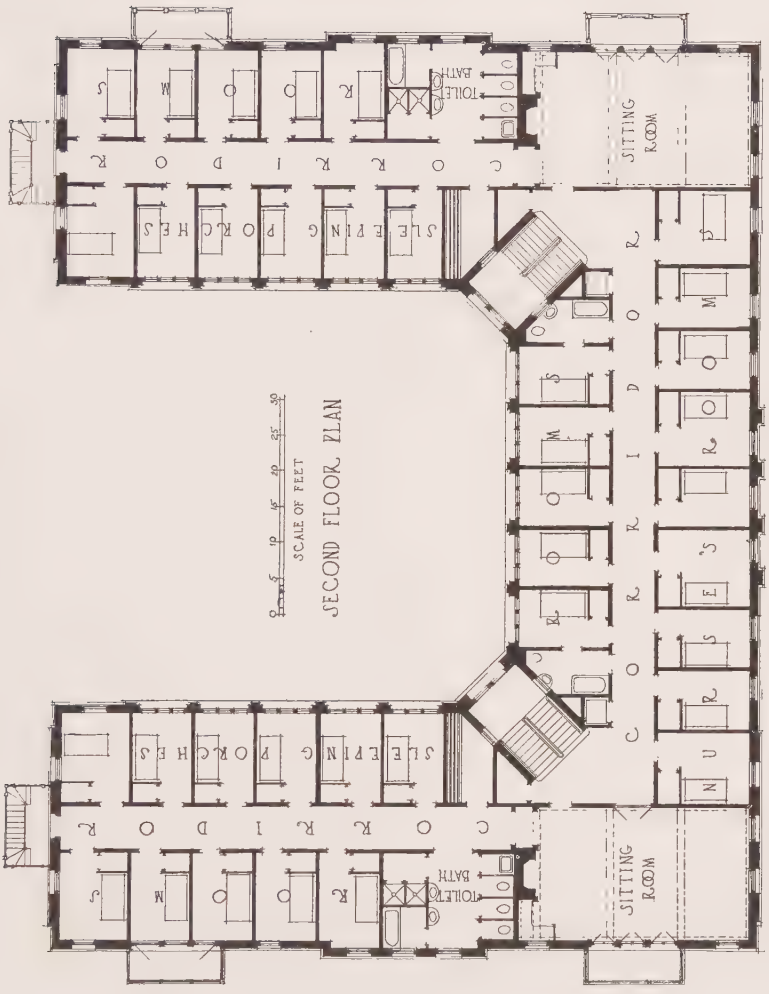


FIG. 344. SECOND FLOOR PLAN, MASSACHUSETTS STATE INFIRMARY HOME FOR NURSES.
John A. Fox and Curtis W. Bixby, Architects.

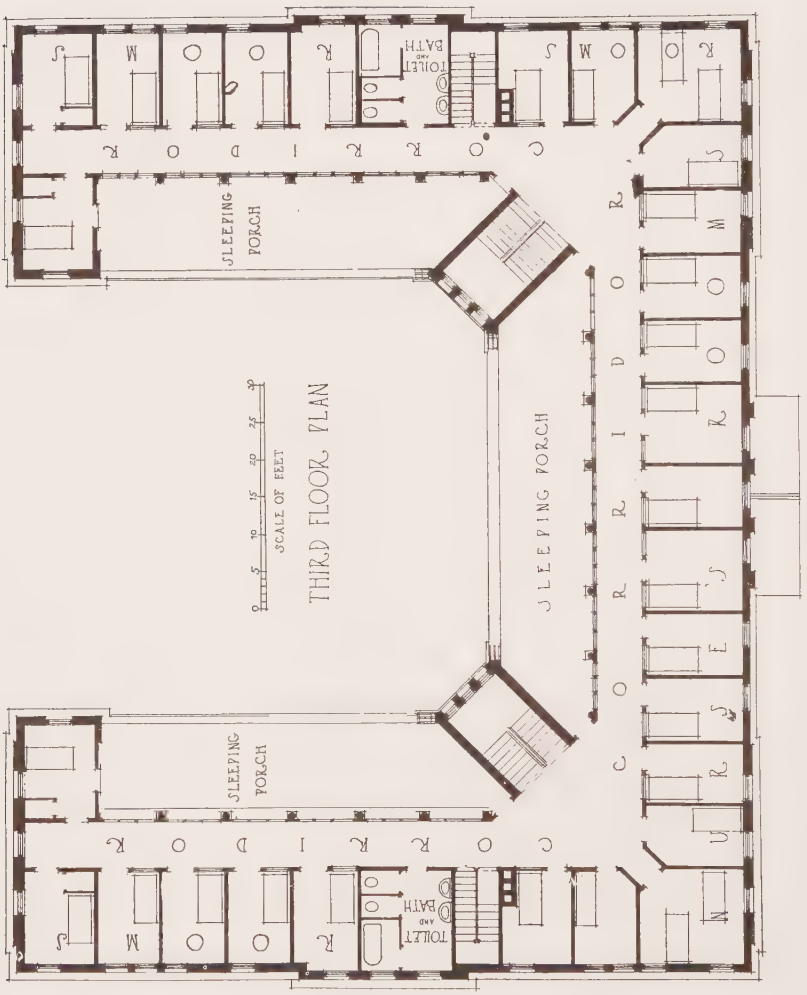


FIG. 344A. THIRD FLOOR PLAN, MASSACHUSETTS STATE INFIRMARY HOME FOR NURSES.
John A. Fox and Curtis W. Bixby, Architects.

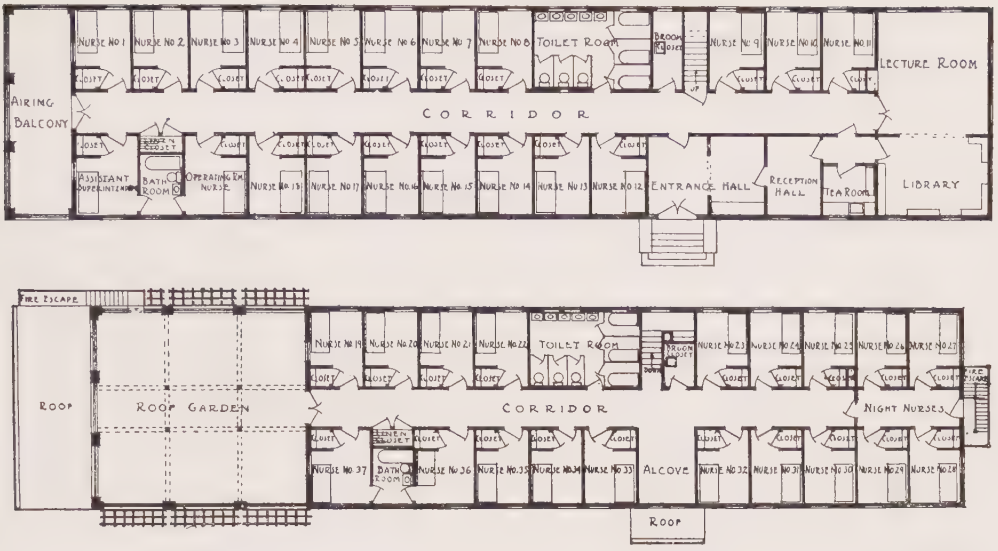


FIG. 345. NURSES' RESIDENCE, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLORIDA. FLOOR PLANS.
Edward F. Stevens, Architect.

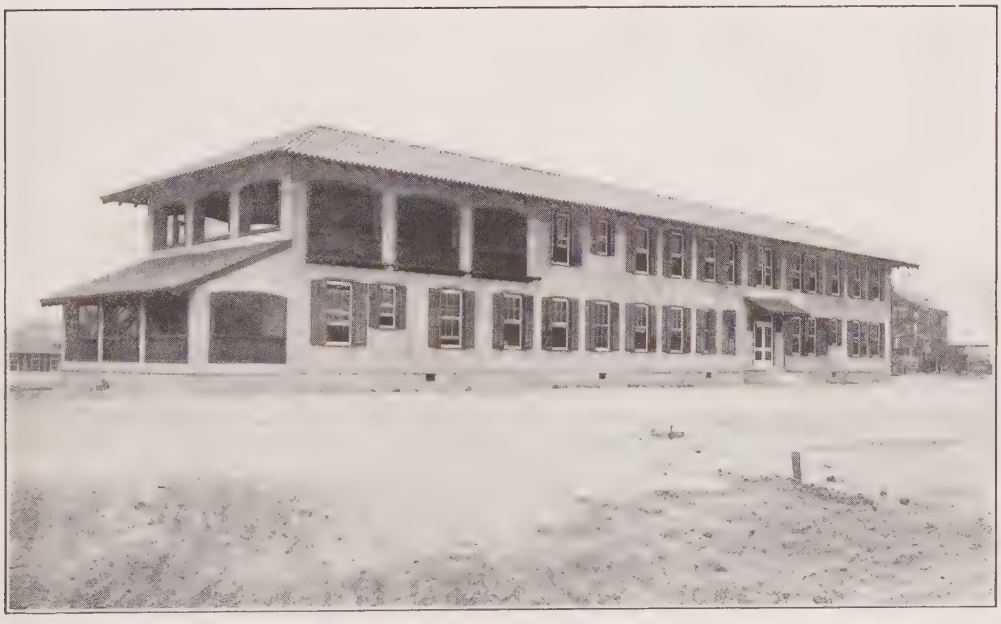


FIG. 346. NURSES' RESIDENCE, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLORIDA.

FIG. 347. SLEEPING PORCH, NURSES' RESIDENCE, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLORIDA.

of nurses is at the northwest corner, and consists of two small rooms and bath. There is a study room on each floor. A small infirmary of four rooms is provided for the care of the sick nurse. The roof garden is sufficiently large for all to sleep in the open.

The nurses' residence of the *Massachusetts General Hospital,* Boston (Figs. 337-339), is an excellent example of a large building. Attention is called to the spacious reception room and to the guest suite on the first floor.

The *Ottawa Civic Hospital,* Ottawa (Figs. 340, 341, 342), plans to house 210 nurses in single rooms. The building has six floors. On the ground floor are class and demonstration rooms, trunk storage, laundry, and tea room. On the first floor is a living room thirty by fifty feet in size, a reception room, library, and the office. On each floor there are sun rooms which constitute small sitting rooms, and ample balconies. The superintendent's suite has its own bath and balcony. Each nurse's room has hot and cold water. One bath is provided for each seven nurses, and a toilet for each six. A special section of the building is set apart for night nurses.

While all hospital buildings should be fireproof for the safety of the helpless patients, it is sometimes possible to give the maximum amount of convenience at a minimum cost by making this section of the institution non-fireproof. This was done in the nurses' residence of the *St. Luke's Hospital* (Figs. 345-347) at Jacksonville. This was built at a very low cost, owing to its simple lines, being planned on a nine-foot unit system, so that all partitions and piping came in verticals, one above the other. All the necessary rooms were provided for the comfort and pleasure of the nurses, including a broad roof balcony for sleeping. The outer finish of this building is the same as the others of the group, which are fireproof.

The plans for the nurses' residence of

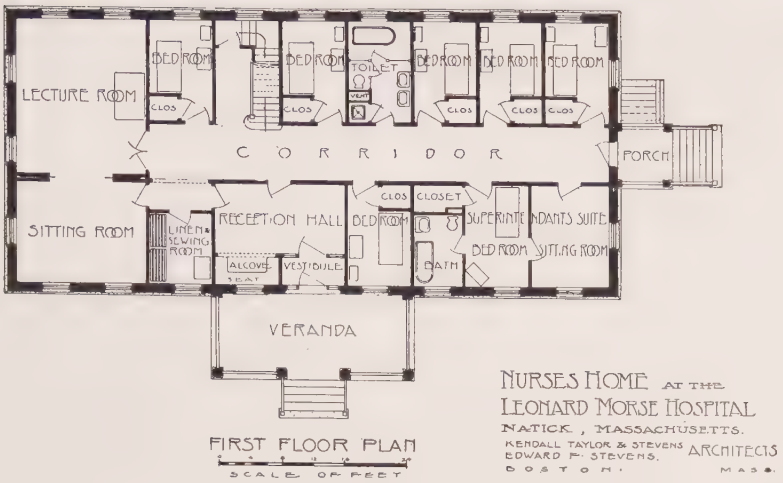


FIG. 348.

the *Leonard Morse Hospital* (Figs. 348, 349) and of the *Augusta* (Me.) *City Hospital* (Figs. 350, 351) are here shown.

In the smaller hospitals, a portion of the nurses' residence is sometimes set apart for the housing of *servants*. The same general conditions should exist for servants as for nurses, but some of the refinements need not be furnished, although a separate room for each individual should be provided. Of course, where the size of the institution warrants, there should be a separate home.

The same conditions apply to *internes'* quarters. The internes, who are college men accustomed to refinement, should have comfortable quarters, sufficiently removed from the patients not to disturb or be disturbed.

One example of *help's building* on even more economical lines is that designed for *Kings County Hospital* (Figs. 352-354), New York City, Department of Charities.

This is planned on an eight-foot unit basis and has all the necessary common rooms, toilets and staircases for a building of this nature.

In the *Ottawa Civic Hospital,* Ottawa,

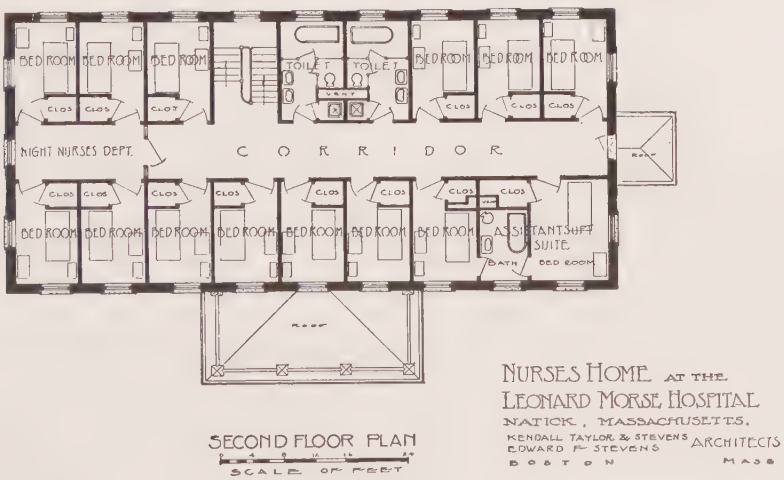


FIG. 349.

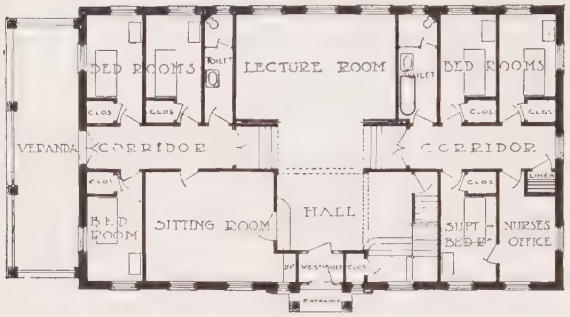


FIG. 350.

Canada, the third floor of the service building is fitted up for twenty-three internes. It has a direct connection with the main hospital. There is a suite of rooms for the superintendent, a library, a large living room, two toilet and bath rooms, trunk room, etc.

In the *Victoria General Hospital,* Halifax, a similar arrangement is made, fourteen internes being housed on the third floor of the service building, in comfortable quarters, separate from anyone else.

In both of these buildings, the housekeeper and her assistants are housed on the floor below the internes, in special suites, disconnected from the working part of the building.

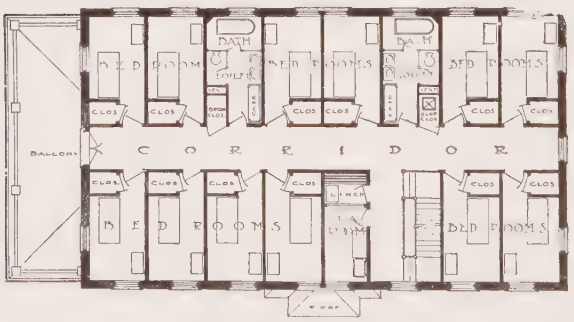
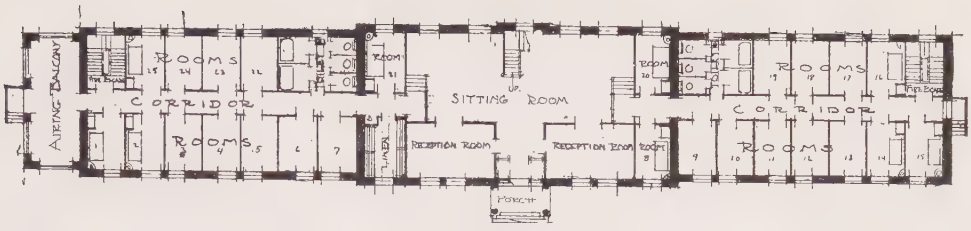
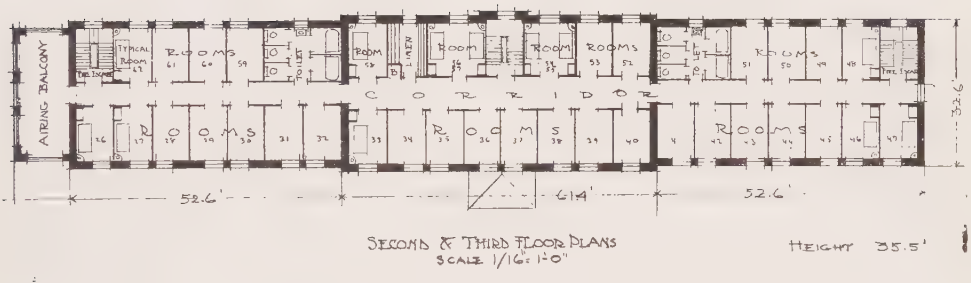


FIG. 351.



FIRST FLOOR PLAN
SCALE 1/16"=1'-0"

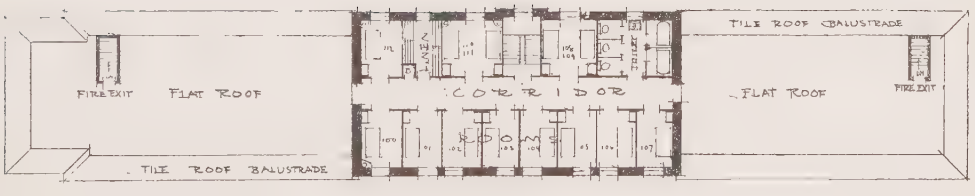
FIG. 352. PROPOSED HELP'S BUILDING.
Edward F. Stevens, Architect.



SECOND & THIRD FLOOR PLANS
SCALE 1/16"=1'-0"

HEIGHT 35.5'

FIG. 353. PROPOSED HELP'S BUILDING.
Edward F. Stevens, Architect.



FOURTH FLOOR PLAN
SCALE 1/16"=1'-0"

FIG. 354. PROPOSED HELP'S BUILDING.
Edward F. Stevens, Architect.

CHAPTER XV.

The Kitchen and Laundry

The location and plan of the kitchen building, so-called, are most important factors in the success or failure of an institution. The kitchen, whether an isolated building or a department in a general building, should be so located that food—hot, palatable food—can be readily transported, with the least delay and the least amount of handling, from the place where it is cooked to the patient's tray or dining table. To do this, certain conditions must exist—

(a) A central location,
(b) Adequate means of transporting,
(c) Serving kitchens of sufficient size and equipment to care for and distribute food properly.

If occupying only a portion of the building, the kitchen should be on the ground floor or on the highest floor. Many of our best hospital superintendents contend that the kitchen should be on the upper level, while others agree that, owing to a greater facility for delivery of supplies, the lower basement level is the more economical. With a refrigerating system and good elevator service, the upper level kitchen has certain advantages, the chief being the freedom from odors of cooking and the exclusion of tradesmen from the kitchen. On the other hand, the low-level kitchen affords quicker delivery of supplies, quicker disposal of waste products, and, as the heavier demand is apt to be on the lower floors, quicker service to the greatest number of patients.

The kitchen should not be too large or too small. If too large, time is wasted, owing to the distance traveled; if too small, it will be too crowded to secure the best results. In other words, the kitchen should be planned to meet the needs of the institution, not forgetting, however, its probable growth.

GENERAL PLAN.

The hospital kitchen should be planned like a modern factory—that is, to receive the raw material and to deliver the finished product (which is palatable food) with as few lost motions and delays as would be expected by a modern manufacturer in his factory. If there is any delay by the way, there is a loss in food value, and the patient has in consequence less of vital energy than with efficient service. The same thing applies not only to the patient but to the nurse, the attendant, the servant, and all along down the line. An underfed nurse or domestic cannot do her best, so that as a purely business proposition it pays to feed well everybody connected with the institution.

In the kitchen, the *building* should be planned *around the equipment*. The ranges, which are perhaps the apparatus most constantly in use, should be placed in the most convenient place—generally in the center, where all sides are available.

For fuel, circumstances differ, and what is best in one part of the country may not be good in another. Gas, either natural or artincial, in the long run is not only the most economical but the most efficient. There is no dust, no dirt, no unsightly or unsanitary coal scuttle in the way. The modern blast burner ranges give the same quality of heat as the best coal range. Broilers or toasters are equally good in gas, and these should be placed on the same line and near the range. In the institutions in the west crude oil is used both for kitchens and for heating boilers.

With electricity at a minimum cost much work can be done with that medium.

Much of the cooking formerly done on the range can now be more efficiently done

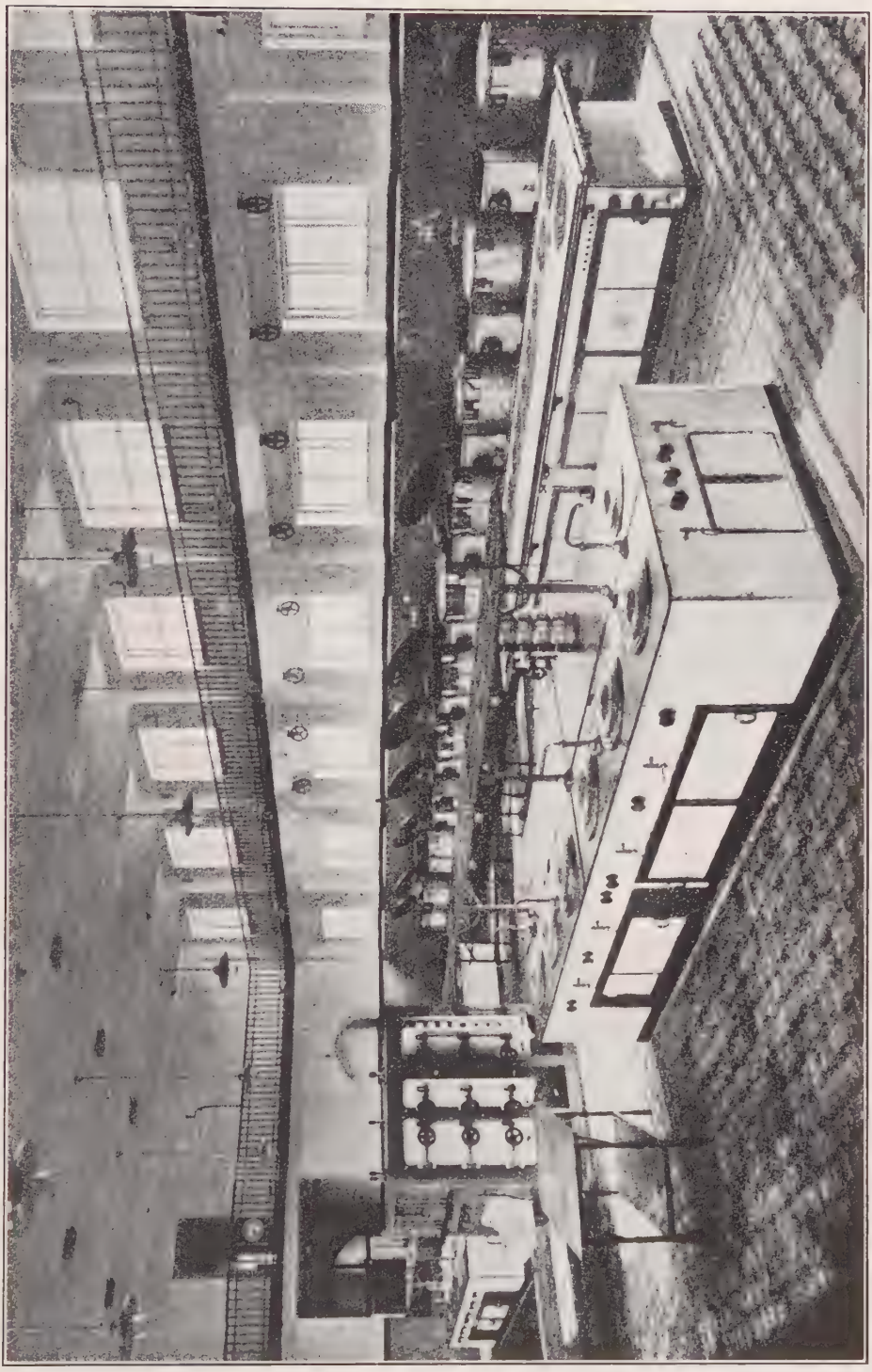


FIG. 355. KITCHEN, BISPEBJERG HOSPITAL, COPENHAGEN, DENMARK.

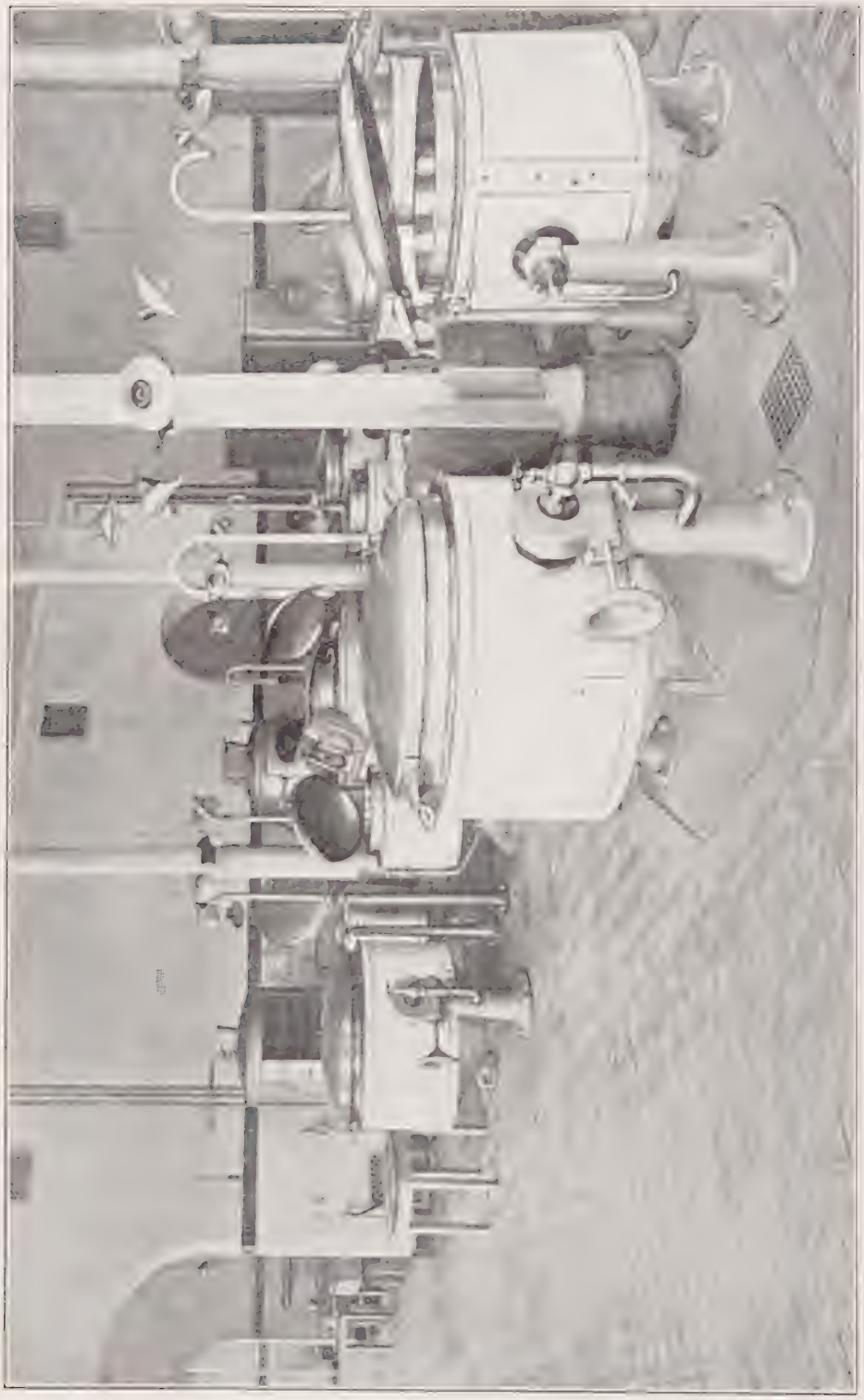


FIG. 356. KITCHEN, RIGS HOSPITAL, COPENHAGEN, DENMARK.

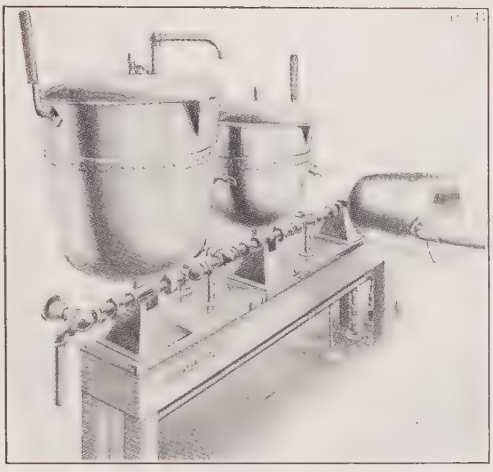


FIG. 357. TILTING KETTLES.

by steam. In the pressure steam cooker practically all vegetables can be prepared. This cooker should be of sufficient size and of proper design to do the work easily.

The steam stock kettles as made and used in Europe are much finer in workmanship and more attractive than those made in America. American manufacturers have begun to make finer, more attractive, and more hygienic apparatus.

For the cooking of cereals, the tilting kettles are the simplest in action, being easily manipulated and cleaned (Fig. 357).

All steam apparatus should be planned to withstand a pressure of at least sixty pounds per square inch. To that end, a reducing valve for the kitchen steam supply should be provided.

The kitchen sinks should be planned for their special uses—deep sinks for pots and pans, and shallow sinks for smaller utensils. Vegetable sinks can be grouped together. A small sink in the cook's table often saves steps.

The many labor-saving devices driven by the small motor, such as meat choppers, bread and cake mixers, ice-cream freezers and ice crushers, vegetable an fruit parers, make the work of preparing food vastly easier. Power dish-washers save much time and many dishes. Steam tables have become a necessity in keeping food palatable.

All cabinets and racks should be open and easy to clean. Dish cabinets and dish warmers should be at a proper height from the floor to prevent extra muscular strain in removing the dishes.

The *Cincinnati General Hospital* kitchen building (Figs. 360, 361, 362) has the top-lighted kitchen in the center, with the diet kitchen at one side and the bakery at the other. The dining rooms for officers and internes are at one side, those for servants at the other, each having its separate entrance. The food service for the hospital is in the center, whence the food is sent overground in heated cars, to the wards.

The *Ottawa Civic Hospital,* Ottawa, Canada (Figs. 78-81), has its service building planned so that all its activities are concentrated around the kitchen and the food delivery. The building is rectangular, with a skylight above the kitchen part, so that it is high, well-lighted and well-ventilated. The receiving department is at the left in the rear, the refrigerators being along that side of the building in their own corridor. At the front of the left side (convenient to the supplies) are the diet kitchen and the dietician's office. In the kitchen itself, the scullery or preparation part is at the left (near the supply entrance), the cooking in the center, the bakery at the right. The steam tables and the space for the

FIG. 358. KITCHEN DETAIL, STATE HOSPITAL, KARLSRUHE, GERMANY.

FIG. 359. KITCHEN, RUDOLPH-VIRCHOW HOSPITAL, BERLIN, GERMANY.

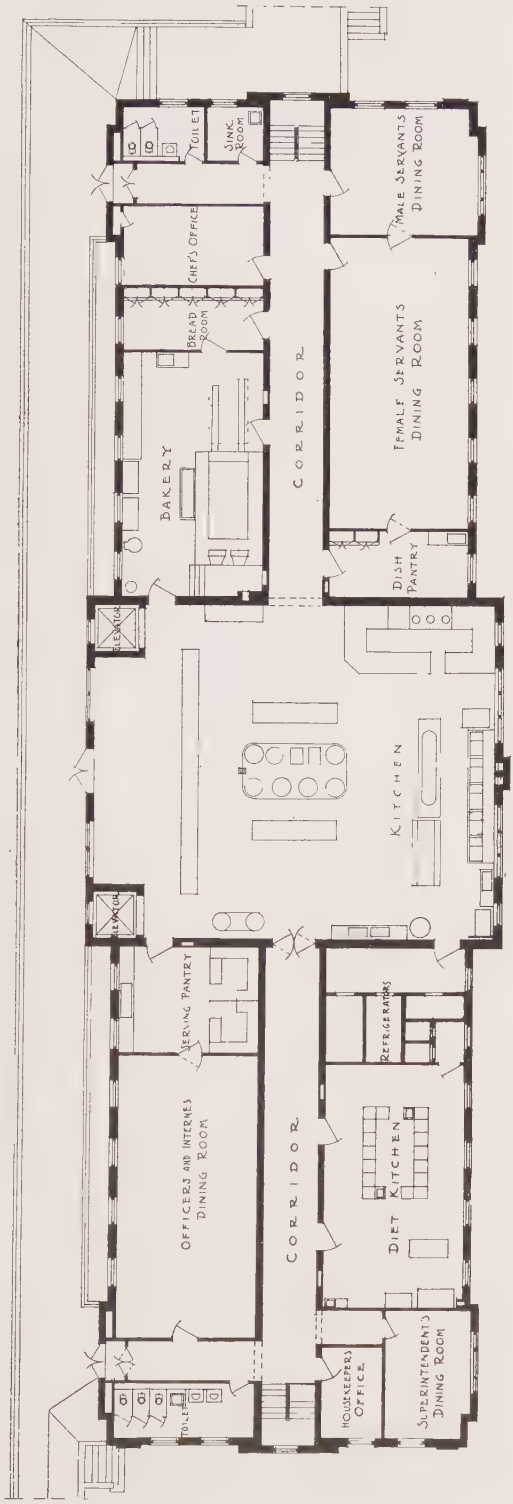
delivery of food is in the center front, whence the food cars are sent through the tunnel to lifts at the right and left sides of the building. The housekeeper's office is at the right; also the servants' dining rooms, which have cafeteria service.

On the mezzanine floor are storage rooms for kitchen supplies, the linen stores and the sewing room. On the next floor are dining rooms for two hundred nurses, the superintendent and the staff, with one servery in the center. The apartments of the housekeeper, dietician and their assistants are on this floor, quite separate. The top floor houses twenty-three internes.

In the *Victoria General Hospital,* Halifax, N. S., service building (Figs. 363, 364) food supplies are received at the right, the range, cookers and service to the wards and dining rooms are in the center, and the diet kitchen is at the right, near the supplies. There is a cafeteria service for the servants on this floor. The dining rooms for superintendent, staff and nurses are on the second floor, with a central servery.

In the *Ohio Valley General Hospital,* Wheeling, W. Va., the main kitchen (Fig. 100) is lighted from above and at the sides. It is ventilated through a large duct extending to the top of the tower of the hospital building, so as to eliminate all kitchen odors from the hospital. The stores and refrigerators are at the right (other store rooms are on the floor below), the scullery and vegetable preparation at the rear of the kitchen itself, the cooking being done in the center. The service of food to hospital food cars and to the dining rooms is in the space at the left of the plan. The dining rooms are grouped around the serving end of the kitchen. The nurses' and servants' service is cafeteria. There is a restaurant for the friends of patients.

Attention is called to the kitchens of the *New Rochelle Hospital,* New Rochelle, N. Y. (Fig. 381), to that of the *Wesson Maternity Hospital,* Springfield, Mass. (Fig. 157), and the *Good Samaritan Hospital,* Sandusky, O. (Fig. 320). These are small units, but the principles of planning are the same, that supplies shall enter at one side, be pre-



KITCHEN AND DINING HALL
FIRST FLOOR PLAN
SCALE 0 4 8 12 16

NEW GENERAL HOSPITAL
CINCINNATI — OHIO
SAMUEL HANNAFORD & SONS — ARCHITECTS
CINCINNATI — OHIO

FIG. 360.

FIG. 361. KITCHEN BUILDING, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.

FIG. 362. FOOD CARS IN KITCHEN, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.
Samuel Hannaford & Sons, Architects.

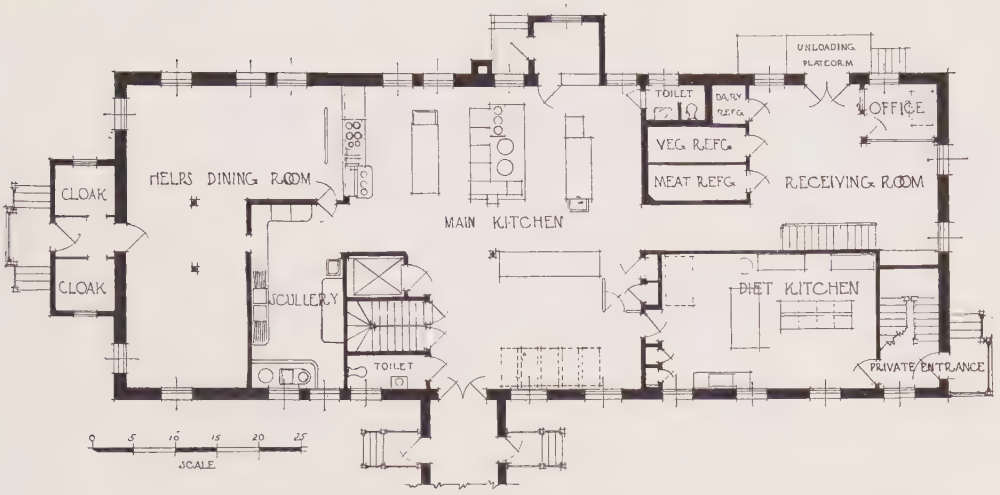


FIG. 363. FIRST FLOOR, SERVICE BUILDING, VICTORIA GENERAL HOSPITAL, HALIFAX, NOVA SCOTIA.
Stevens & Lee, Architects.

pared there, cooked in the center, and served from the other side.

Diet Kitchens. Every hospital of considerable size should have a room for the preparation of special diets. This room should be near but not a part of the kitchen. It must also be near the food lifts and the route of service. It is customary to use the diet kitchen for a teaching kitchen for the nurses in training; and where this is the case, cabinets, fitted for individual service, are sometimes provided.

Attention is called to the diet kitchens of the *Cincinnati General Hospital* (Fig. 360), the *Ottawa Civic* (Fig. 78), the *Victoria General,* Halifax (Fig. 363), the *Ohio Valley General,* Wheeling, W. Va. (Fig. 100), and the *New Rochelle Hospital* (Fig. 381).

Serving Kitchens. The serving kitchen has a place among the important rooms of a hospital, for in this room the trays for the food are prepared, and from it the food is distributed. If the serving kitchen is conveniently arranged, the

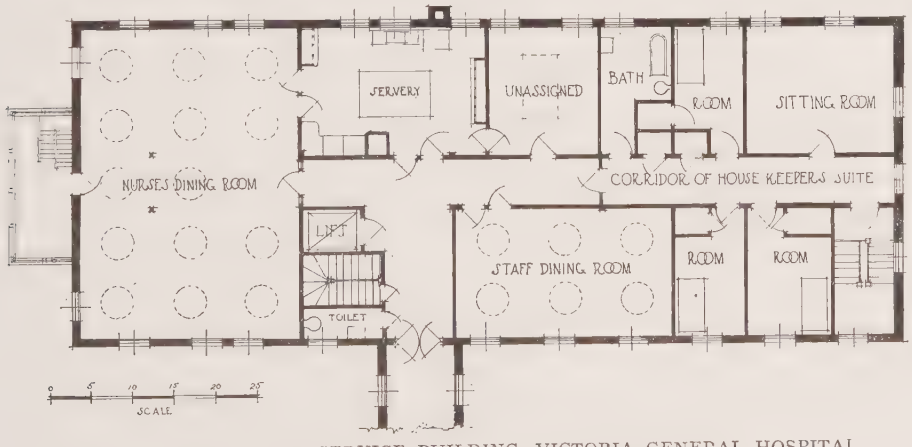


FIG. 364. SECOND FLOOR, SERVICE BUILDING, VICTORIA GENERAL HOSPITAL, HALIFAX, NOVA SCOTIA.
Stevens & Lee, Architects.

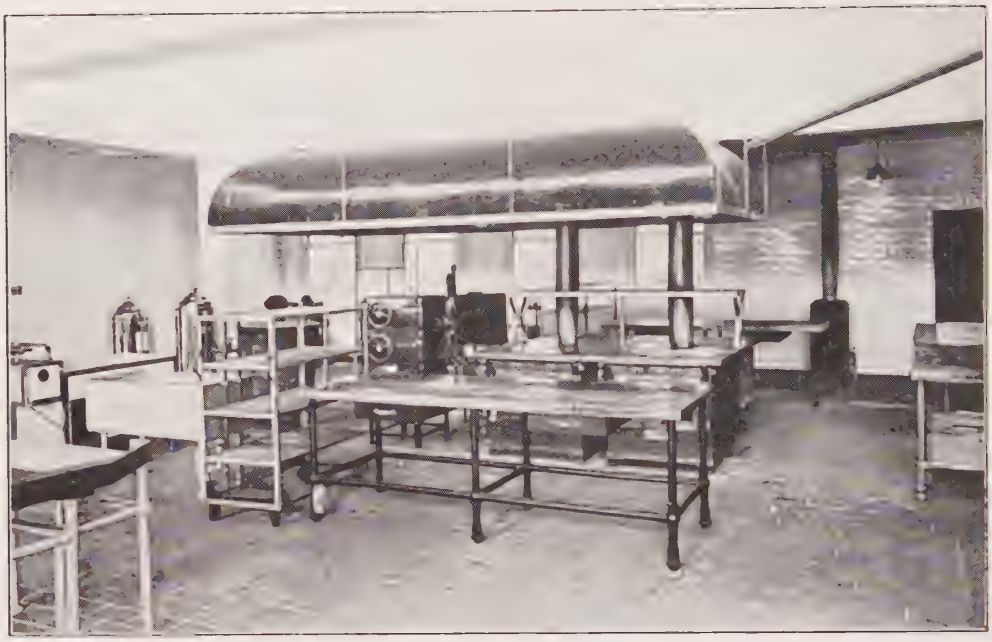


FIG. 365. MAIN KITCHEN, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.

FIG. 366. KITCHEN, ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.

FIG. 367. DIET KITCHEN, BRIDGEPORT HOSPITAL, BRIDGEPORT, CONN.

FIG. 368. SERVING KITCHEN, ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.

food is more likely to be brought to the patient in the best condition. And what a difference even the looks of a tray makes to a delicate patient!

How often one hears it said about a hospital, "The operating room technique is perfect; the nursing is all that can be desired; but the food—and the service!" Good food, properly served, goes a long way toward offsetting deficiencies in other departments.

The serving kitchen should be of sufficient size to do the work properly. In one of the earlier hospitals designed by the writer, the planning of which was directed largely by the building committee, the desire on their part to make every inch available for patients made it necessary for the serving kitchen to be so reduced in size that it has always been a great drawback to the best serving of meals. A little more space devoted to this room would have added greatly to the comfort of both nurse and patient.

What are the essentials and what are the luxuries of a serving kitchen? The essentials are:

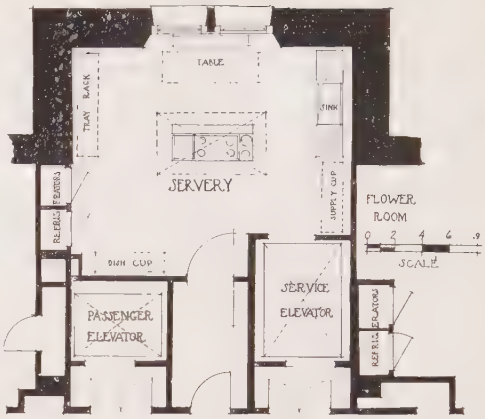


FIG. 369. SERVING KITCHEN, ROSS PAVILION, ROYAL VICTORIA HOSPITAL, MONTREAL, CANADA.
Stevens & Lee, Architects.

1*st, Proper Location*—Remember that a ward serving kitchen is a very busy place three times a day. Many utensils

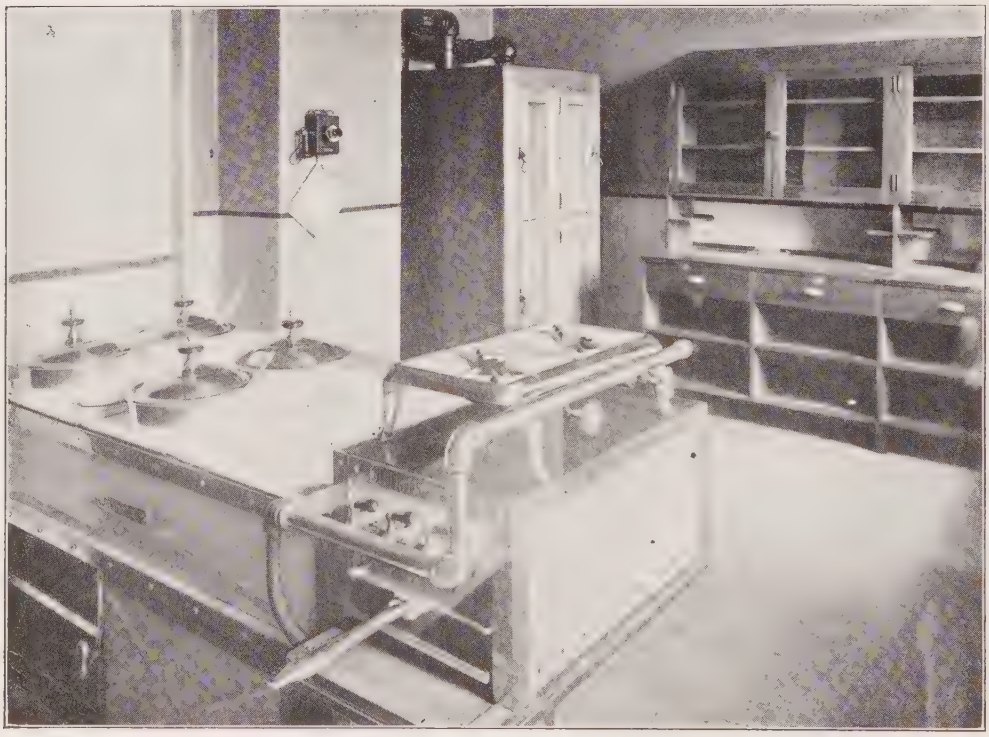


FIG. 370. SERVING KITCHEN, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.

FIG. 371. SERVING KITCHEN, ST. LUKE'S HOSPITAL, NEW BEDFORD, MASS.

FIG. 372. SERVING KITCHEN, SHOWING FOOD TRUCK, CINCINNATI GENERAL HOSPITAL, CINCINNATI, OHIO.

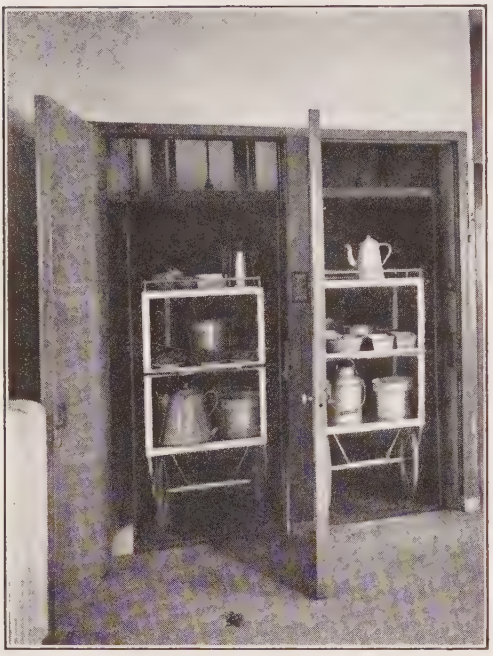


FIG. 373. AUTOMATIC LIFTS FOR FOOD CARS.

must be handled, washed and put away; food trucks are going and coming; so that this room should be located remotely or in such a way that the sound from the room is cut off from the patients. This may be accomplished by having the serving kitchen entered from a side corridor, as in the Melrose Hospital (Fig. 304); or through a vestibule, as at the Royal Victoria (Fig. 115); or by having it entirely apart, as at the Bridgeport Hospital (Fig. 69).

2nd, Room Enough to Lay Trays—There should be room enough, and the room should be so planned that no one will be crowded while preparing the meals. If the building is a multi-story building, special food lifts, large enough to carry a food car, should be provided, and space enough to bring the car into the room to discharge it.

In moving the food from the kitchen it should be handled as little as possible. To that end, the food truck loaded in the kitchen should not be disturbed until it reaches the serving kitchen. This food truck can be taken on the serving elevator; or, better still, special food elevators may be provided, working automatically from the sending point on the kitchen level. These food trucks can be kept warm by electricity, hot water, or hot soapstone. The one shown in the illustration (Fig. 375) is heated by soapstone.

3rd, Keeping Food Warm or Cold—The steam-table is almost indispensable for keeping food hot, and should be pro vided with a gas plate and warming closet.

Tray racks of sufficient capacity for holding all trays should be provided. These racks should be mounted on ball-bearing casters, so that if required the trays can be brought *en masse* to the ward door. The use of the portable hot table is growing in popularity (Fig. 376). For some classes of patients this makes the most satisfactory method of serving.

Refrigerators should be built or selected with care and, with due regard for hygiene, should be either porcelain or tile lined, and should have properly trapped drains. If there is a refrigerating plant,

FIG. 374. OPEN FOOD TRUCK.

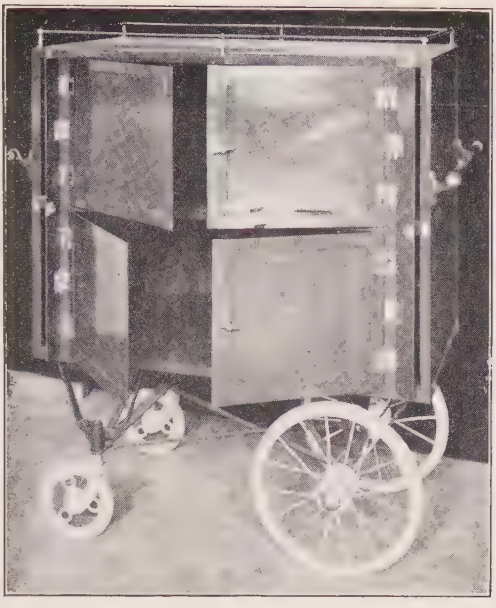


FIG. 375. HEATED FOOD TRUCK.
Heat is applied by inserting hot soapstones in pockets at the sides.

by all means extend the pipes to these small serving-kitchen refrigerators.

4th, Utensils and Their Cleaning—Among the luxuries of the serving kitchen might be counted special egg boilers, coffee percolators, individual services for private patients, special china and glass, hot plates and more attractive trays and linen.

Where the dishes from patients with infectious diseases are cared for, the dish sterilizer is absolutely essential.

The location and size of the sink is important. There should be an ample drainboard and the sink set high. The tendency of the plumber is to place the sink at *his* standard height, making everyone who uses it stoop, while placing it a few inches higher would save many a backache. The material for the sink is largely a matter of fancy. Iron, porcelain and soapstone are used.

A suitable receptacle should be provided for the dishes and utensils after they are cleaned. The cabinet should be hygienic in its construction, easily cleaned, with slanting top so that the dust may be seen and removed. It should contain drawers and cupboards enough to store the cutlery and silver needed in the section served by ward kitchen.

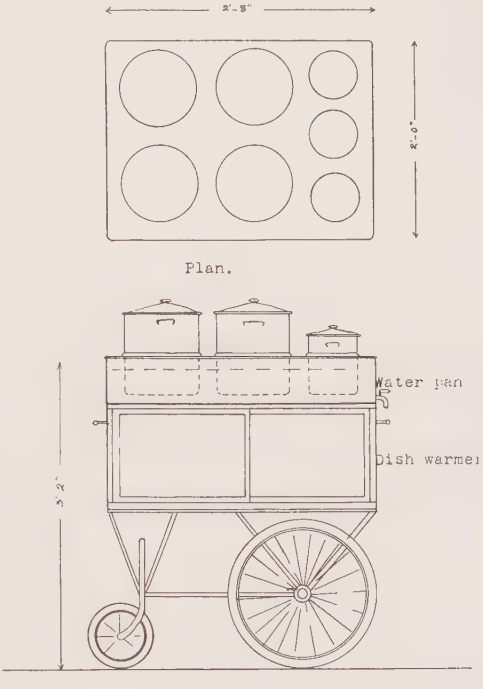
In General—The room should be tiled to a height of four feet. If the expense of this is prohibitive, place tiling at least back of all plumbing fixtures.

The floors should be of a non-porous substance, like magnesite, terrazzo, or tile; if of tile, a gray or buff is much easier to care for than white.

The plan of the serving kitchen of the *Ross Pavilion* of the *Royal Victoria Hospital, Montreal* (Fig. 369), illustrates the principles laid down above.

Dining Rooms. The dining-room for nurses (if in the same building with the kitchen) should be in a well-lighted portion of the building, and some attention should be paid to the decoration and artificial illumination. A serving room, equipped with steam table and coffee urns, should be placed between kitchen and dining-room, if possible.

It has been found in many institutions that a dining-room or *restaurant* for friends of the patients is not only a



FOOD CAR.
For serving patients direct from car.
FIG. 376. PORTABLE STEAM TABLE.

source of satisfaction to the friends but also a profit to the hospital.

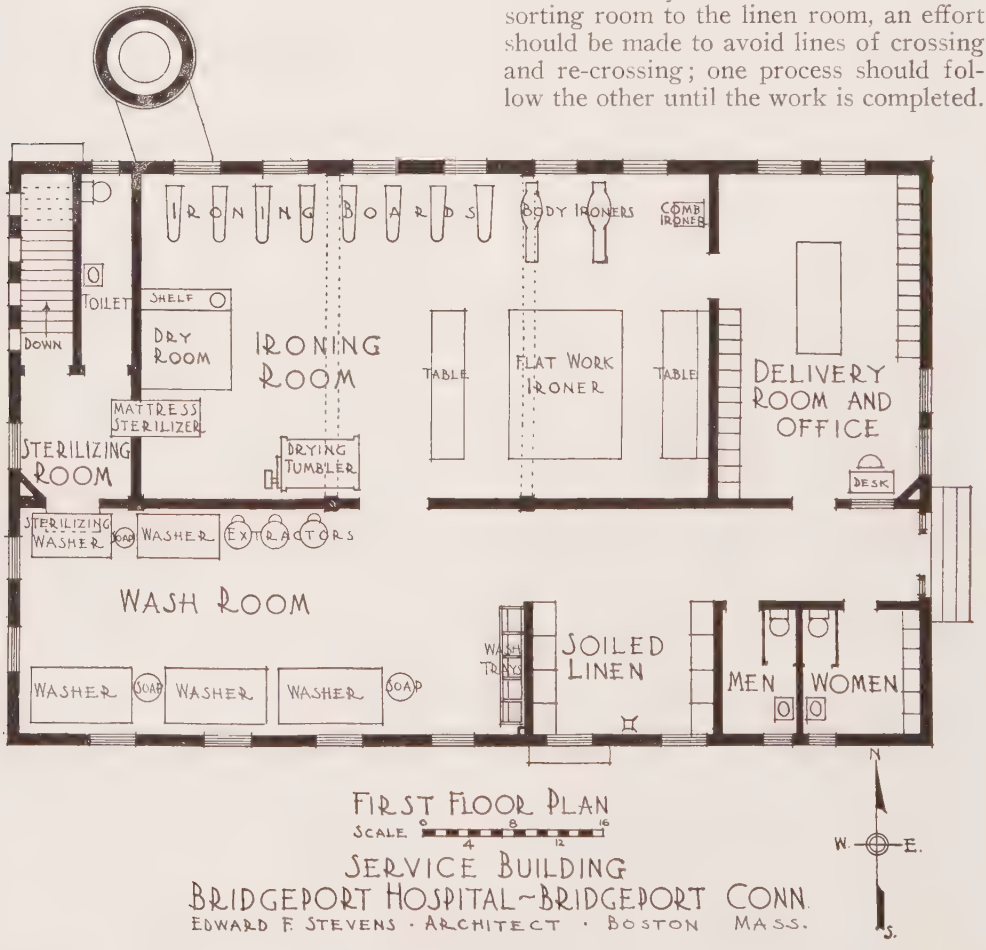
The feeding of servants has been accomplished in an economical way in many institutions by establishing a *self-serve* system, where each person selects what suits him best, takes it to the table and eats. This removes dissatisfaction on the part of the servants, facilitates the service, and reduces the number of waiters.

More attention is paid to the design and finish of the kitchens in many of the larger European hospitals than in this country. (Figs. 355, 356, 358, 359).

THE LAUNDRY

Like the kitchen, the *Laundry and Disinfecting Plant* should have an accessible location to which the soiled linen and articles of disinfecting can be easily brought and from which the fresh linen can be removed. The size and character of the building is, of course, governed by the requirements and size of the institution.

In planning the hospital laundry, the same care and thought should be used as in planning a factory; that is, to secure the greatest efficiency in the work, from the bringing in of the soiled linen to the delivery of the clean. From the sorting room to the linen room, an effort should be made to avoid lines of crossing and re-crossing; one process should follow the other until the work is completed.



FIRST FLOOR PLAN
SCALE 0 4 8 12 16

SERVICE BUILDING
BRIDGEPORT HOSPITAL~BRIDGEPORT CONN.
EDWARD F. STEVENS · ARCHITECT · BOSTON MASS.

FIG. 377.

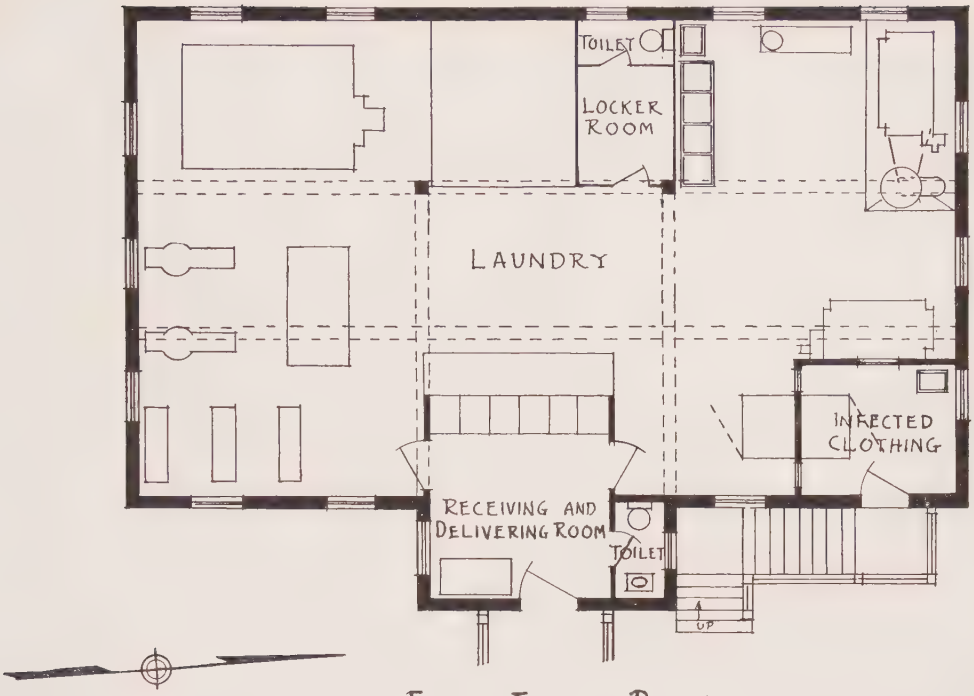


FIG. 378. LAUNDRY, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.
Edward F. Stevens, Architect.

FIG. 379. LAUNDRY, HOSPITAL FOR SICK CHILDREN, TORONTO, CANADA.

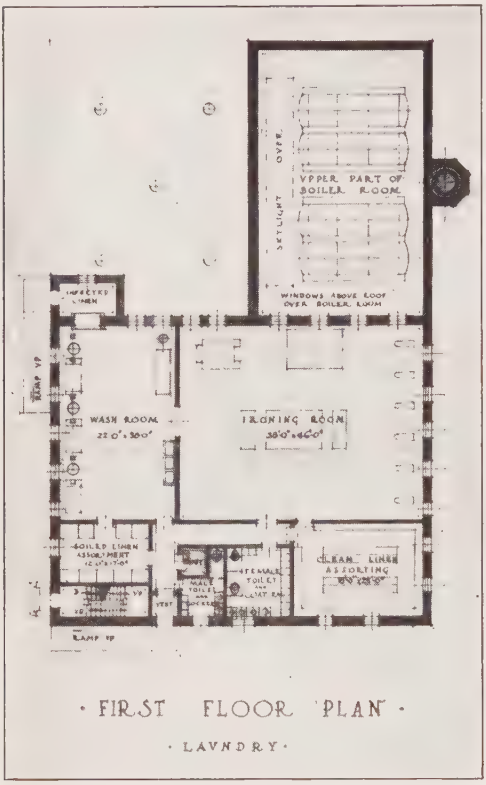


FIG. 380. LAUNDRY, OTTAWA CIVIC HOSPITAL, OTTAWA, ONTARIO.
Stevens & Lee, Architects.

The washing or wet work should be kept separate from the ironing or dry work.

If, as is quite common now in hospitals, the soiled linen is bagged at the ward unit, then easy transportation should be provided for these bags, and a covered corridor above or below ground is quite desirable for this transportation.

In regard to the *equipment* of the laundry, much may be said, but whatever apparatus is used, the principle which has been set forth for the conservation of human energy should be brought into play in this department. For a single example take the sorting bins; if these be placed high enough so that it is not necessary to stoop every time a single article is handled and if these sorting bins are made with easy-rolling wheels, the transmission of the soiled linen will be secured with the least amount of fatigue on the part of the operators.

The various items of machinery should be selected for the efficiency they will show. A washing machine capable of doing the work of three ordinary machines and costing the price of two is an economy. The same is true with reference to the extractor, the mangle, the drying tumbler, etc.

Electricity is rapidly taking the place of gas and steam in many of the laundry operations. The body ironer is being superseded by the steam press.

In a large hospital it is considered desirable to have the staff linen laundered in an entirely different department from the hospital linen.

It is undoubtedly an economy to have the main linen room of the institution connected directly with the laundry, from which the freshly laundered articles as well as the new supplies can be given out. In this way, the linen, whether new or old, is under one supervision.

A few illustrations will serve to show some of the points mentioned.

In the laundry of the *Bridgeport Hospital* (Fig. 377), the writer has attempted to work out the principles mentioned; that is, the soiled linen is first taken care of in the soiled linen sorting room; then carried to the wash room where the wet washing work is done; thence through the drying room, mangle and linen room, into the main linen supply room. Provision for infected clothing, which is brought in through a separate entrance and introduced into the washing department of the laundry through a sterilizer or sterilizer washer, is here provided.

In the small laundry of the *St. Luke's Hospital at Jacksonville* (Fig. 378), where care of both general patients and contagious cases is provided, the same provision is made for the infected linen—passing through a disinfector before reaching the laundry proper.

Fig. 379 shows the interior of the laundry of *Hospital for Sick Children,* at Toronto.

In the service building of the *Ottawa*

Civic Hospital, Ottawa, Canada (Fig. 380) the basement contains the power plant for the hospital, the engine room, boiler room, fuel store, workshop, etc. The first floor is taken up by the laundry. The second and third floors house twenty-eight domestics in single rooms, with sitting room, balcony, toilets, baths, trunk room, linen room, etc.

On the laundry floor, the soiled linen is brought from the hospital by car or truck to the entrance at the left of the building; the trucks come up a ramp directly to the sorting room, so that there is no lifting. The sorting room is directly off the wash room. Infected linen goes to a special entrance at the rear, is put into the disinfector there, and taken out from the laundry side. To the right of the wash room is the ironing room, with a drying tumbler for blankets, pillows, etc., and a dry room at the rear. The flat-work ironer is in the center. The hand ironing boards and special ironers are near the windows. There is plenty of table space. The clean linen sorting room, with tables, shelves and boxes, is at the front, near the entrance.

The service building of the *New Rochelle Hospital,* New Rochelle, N. Y. (Fig. 381), takes care of a hospital of 75 to 100 beds. There is a fair-sized kitchen, and three dining rooms which are served directly from the kitchen. In the laundry there are sorting bins for soiled linen, near the washer, tubs for hand work, soap and starch kettles, a drying room, and space for hand and machine ironing. There is a good sorting room for clean linen.

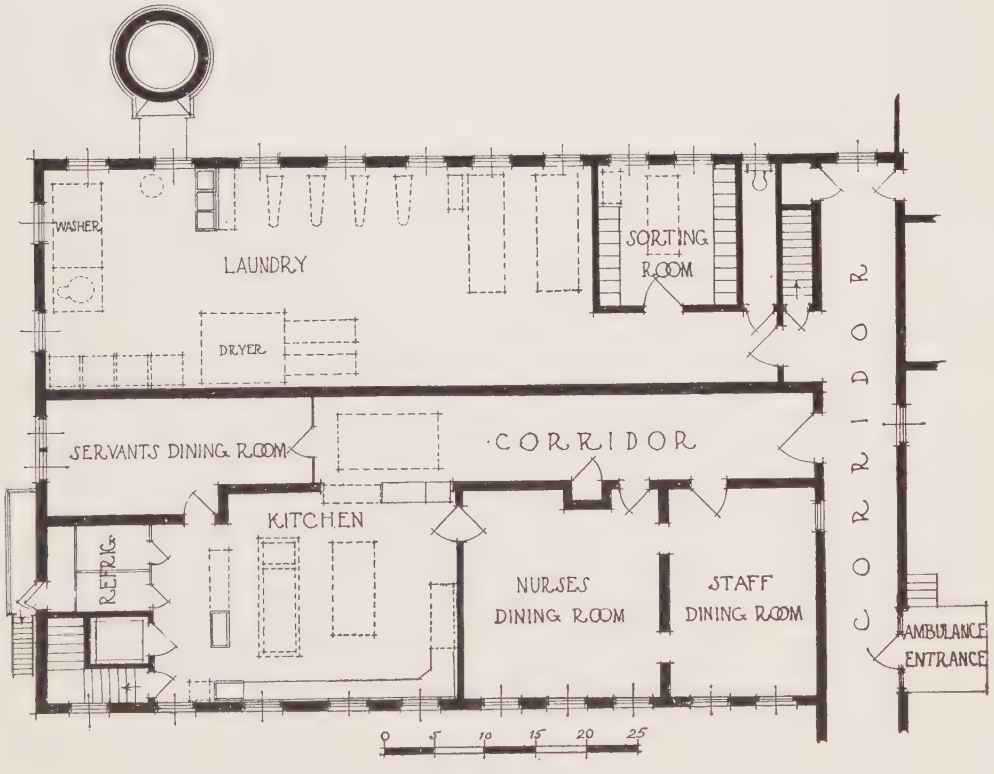


FIG. 381. SERVICE BUILDING, NEW ROCHELLE HOSPITAL, NEW ROCHELLE, N. Y.
Edward F. Stevens, Architect.

CHAPTER XVI.

Heating, Ventilating and Plumbing

The power plant, the center of the mechanical end of the hospital, in many respects is not unlike the power plant for any institution or manufactory. A hospital plant, however, is unique in its demand for the production of steam in an economical way, the transmission of the steam into horsepower energy, either for generating electricity, furnishing high pressure steam for laundry, kitchen, or sterilizing room, inasmuch as steam—i. e. high pressure steam or its equivalent—is needed twenty-four hours a day and three hundred and sixty-five days in the year for sterilizing. Therefore there is little saving made, even in a small plant, by using low pressure heating and using gas or electricity for sterilizing.

Using steam for sterilizing, cooking, and laundry, it can be readily seen that the generating of electricity would show a marked economy, even in the small institution, for in the heating months the exhaust steam from the engines would serve for heating the buildings, reducing the cost of current and heating to a minimum. It is not intended, however, in this book to discuss the power plant methods, but merely the portions of the plant affecting the health and comfort of the patient.

The much discussed problem of how properly to *heat and ventilate* a hospital building has still many unsettled points, almost as many as the floor problem. It is still undecided whether it is best to conduct the air to the ground floor or basement, heat it there, send it through the building warmed, washed and humidified, and force it into the closed room under thermostatic control at a given temperature night and day, a system which necessitates for its perfect working the closing of all doors and windows; or whether to heat the air by means of indirect radiators in the basement or pipe space and conduct it by its own ascentive force to the rooms or wards; or whether to use the simple system of putting the heating units in the room and introducing outside air directly below or above the radiators; or whether by direct hot water, direct steam, or a combination of various systems.

One of the simplest methods and one adopted by the writer for securing fresh warmed air is a modification of the commercial direct-indirect radiator. (Fig. 382). A radiator (hospital type preferred) is set on brackets four inches above the floor; air is introduced through the outside wall directly in line with the bottom of the radiator. A shield, hinged at the bottom to allow for cleaning and extending under the radiator joining the intake pipe, prevents direct cold air from entering the room; and a damper in the direct flue governs the amount of air. At the new General Hospital at Vienna, outdoor air is introduced directly above the radiator, as shown in Fig. 383.

Many medical men and hospital experts agree that the patient in bed, except in special cases, should not have a high temperature in his room. They agree that Nature calls for changes in temperature—that the man in robust health demands them; that the patient who is building up his strength should not be denied them. A certain professor in a technical school used to say to his class that the ideal temperature is that of a sunny June day in a New England pine forest. Such an idea does not involve an even temperature of sixty-eight degrees for the entire day.

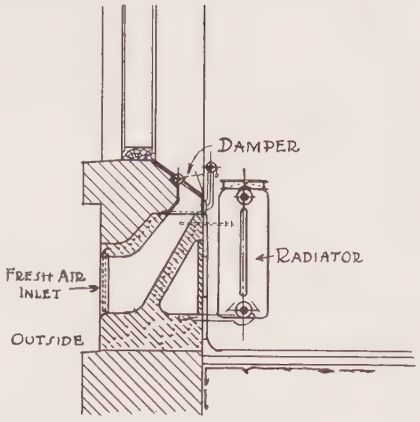
Manufacturers of various apparatuses pride themselves on controlling the temperature of a room to a fraction of a degree, as shown by chart record (Fig. 384). This would not seem to be conducive to the best results, excepting under certain conditions.

The breathed air in a ward or room should be in some way removed, and the means for ventilating so located as to insure a complete circulation of air. If the room is large, there should be vents at top and bottom, with dampers, so that the air can be drawn from either one or the other, by properly adjusting the damper.

The vent ducts should start at the floor, and the floor material extended to the back of the flue (Fig. 385), or the bottom of the flue curved so that no dust shall remain in it. In no case should a register face be used to close the opening at the floor.

However the air is introduced, the exhaust should be placed so as to vent all parts of the room. If the air is introduced at or near the window, the exhaust should be near the door. The desirability of ventilating the clothes cupboards as well as the room led the writer to adopt the method of placing the room vent in the ceiling of the cupboard, cutting the door thereto so as to leave an open space below, setting the cupboard shelf away from the wall, and in this way allowing a free circulation of air, ventilating the room and cupboard. (Fig. 387.)

The natural "tepee" form of ventila-



METHOD OF HEATING GENERAL HOSPITAL AT VIENNA

FIG. 383.

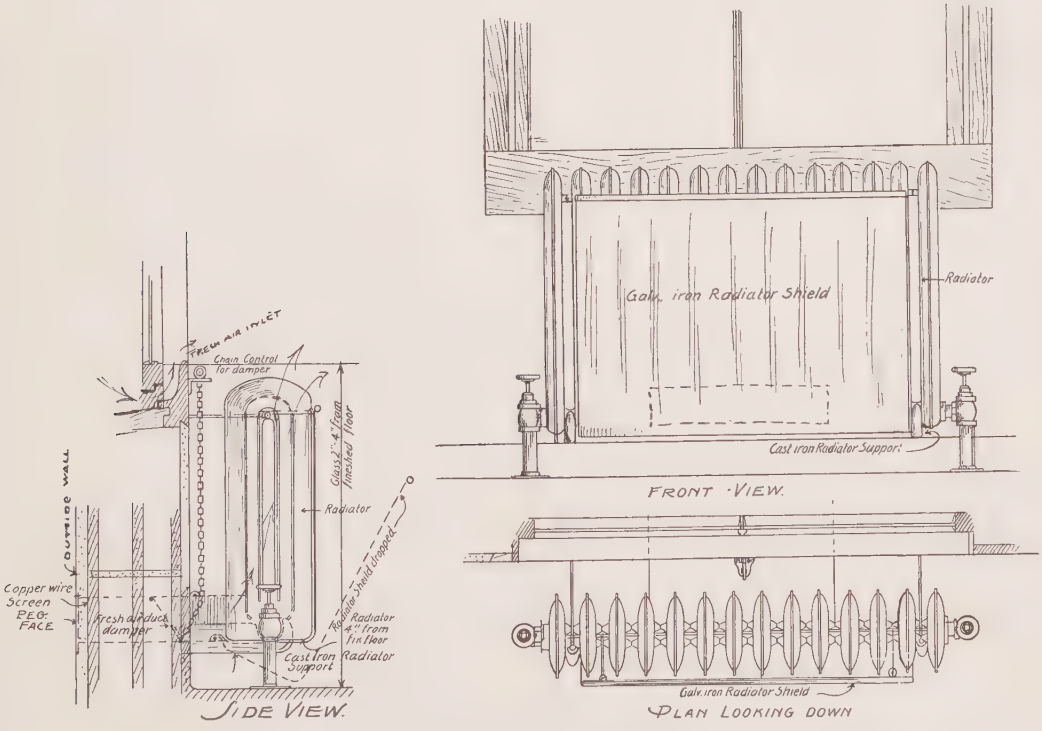


FIG. 382. DIRECT-INDIRECT RADIATOR, SHOWING REMOVABLE SHIELD.

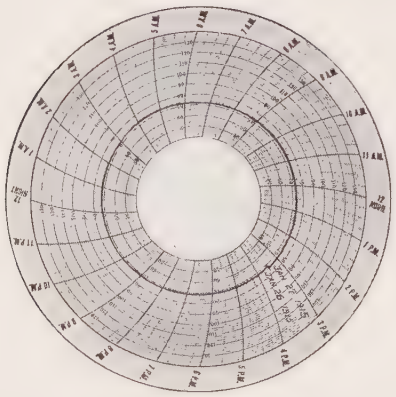


FIG. 384. HEATING CHART, SHOWING UNDESIRABLE CONDITION FOR SICK ROOM.

tion is used in a number of Massachusetts institutions—that is, providing for heat units on the outer walls, either radiators or coils; making the side walls low, about seven feet, and sloping the ceiling at least thirty degrees to a monitor vent. The result is ideal heating and ventilation, but the difficulty of using this method in large units is the necessary waste space involved in the sloping ceiling and the monitor, although this has been carried out in the Children's Hospital in Boston, in the State Hospital School for Crippled Children at Canton, Mass. (Fig. 388), and in the children's ward of the Worcester City Hospital (Fig. 184).

The use of hot water for general heating and steam for special ventilating units gives satisfactory results. The hot water may be in coils of large pipes, easily cleaned, or radiators of hospital type set away from the wall; but the common ornamental radiator, set close to the wall, should never be used in the sick room, since every surface should be available to the brush or vacuum cleaning pipe

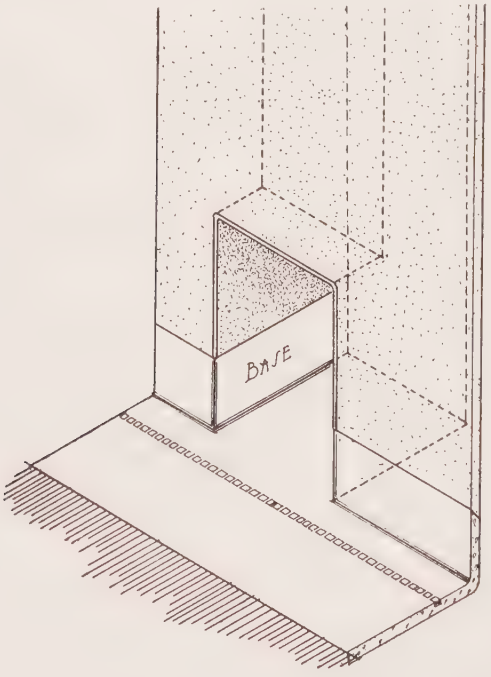


FIG. 385. DETAIL OF VENT FLUE AT FLOOR.

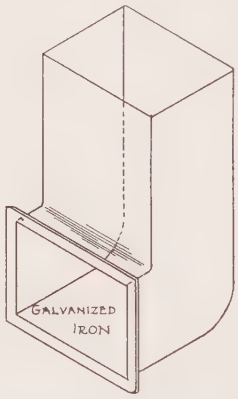


FIG. 386. DETAIL OF VENT FLUE ABOVE FLOOR.

No institution is so economical to heat as is a hospital, because it can be done by utilizing *exhaust steam* from the engines which produce power for the electric light, laundry, and refrigeration. A very small part of the heat units are removed in passing through the engine. The method is therefore a decided economy in the production of power and in the heating of the building.

The heating of the operating room at St. Georg's in Hamburg is one of the more elaborate systems. In the section shown (Fig. 121), it will be observed that the outer sash is double and the air conducted entirely around this hollow space, warming in winter and cooling in summer the floor, the walls, and the ceilings. In winter, additional heat is secured from direct radiators behind thin

nickel plates shown in the walls, but allowing no air from this source to enter the room. The air for the operating rooms is brought first into a clean chamber where it is passed through ground coke, thence over heated coils in winter and over ice in summer, into the fan, where it is driven through a filter of fine sand and gravel, and taken thence to the operating rooms, practically free from all bacteria. The ceiling vents in the operating rooms are closed and there is

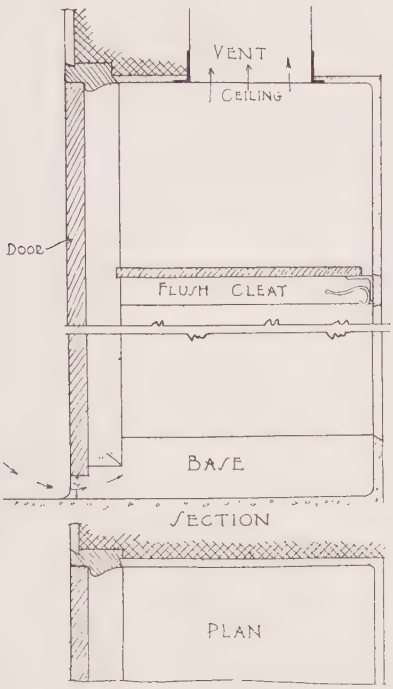


FIG. 387. DETAIL OF VENT THROUGH CLOSET.

sufficient pressure outward so that the opening of a door does not admit any foul air.

A simpler method for the heating and supplying of fresh air for the operating room is by the use of a screen or false wall inside the operating window. The heating unit is placed between the screen and the outer window, introducing outdoor air at the top (not the bottom) of the radiator. The air from the room drawn under the screen mingles with the outdoor air, is heated, and passes out over the top of the screen, warming the room by this inflow and by direct radiation from the glass screen. Additional radiating surface may be placed above the ceiling lights. To prevent the entrance of any dust from outside, gauze removable screens may be placed in the openings at the top of the screen. A section through the operating rooms of the Ross Pavilion of the Royal Victoria Hospital (Fig. 389) will serve to show this method, and a reference to the illustration of operating rooms at the Bridgeport Hospital (Fig. 134) will show the effect from the room.

Additional radiation may be secured by radiators entirely concealed in wall pockets whose openings are covered with metal plates or marble slabs. Fully fifty per cent. of the radiation is lost in this process, though the radiator is hidden effectually and hygienically.

It is desirable to use forced ventilation in the operating suite, if nowhere else. If the suite is small, the fan may be placed nearby and operated when the rooms are in use. Gravity ventilation, however, should be provided, with a bypass valve so connected with the switch and fan that when the fan is stopped the damper automatically opens to the gravity vent, which itself should be accelerated by a steam coil.

No attempt is made here to furnish data for the power plant or the heating and ventilation of the hospital, for these should be worked out with the heating specialist; but these few suggestions are offered as the results of the observation of the writer in his own practice.

Hospital *plumbing*, so far as the pipes, drains and vents, and the so-called "roughing-in" are concerned, is no different from that for any other building of like grade; but the actual fixtures should be selected or designed for the purpose for which they are to be used. Hospital plumbing should be standardized as far as possible.

Where practicable, fixtures should stand clear of the walls to facilitate cleaning and to prevent vermin from finding a lodging, and the wall immediately behind the fixture should be protected with tile placed flush with the ad-

joining plaster. If this is done, the ill effect of spattering will not be serious.

The plumbing *trap,* in our modern times, is the one necessity of every plumbing fixture which has the reception and discharge of liquids into the drainage system. It can readily be seen, if the hygienic condition of our fixtures be considered, that this trap should have two possibilities

(a) To safeguard properly the escape of sewer gas or sewer odor into the room;

(b) To be so constructed that the *inside* as well as the outside, or at least the inside to the water line, shall be accessible for frequent cleaning.

To do this latter readily, the trap must

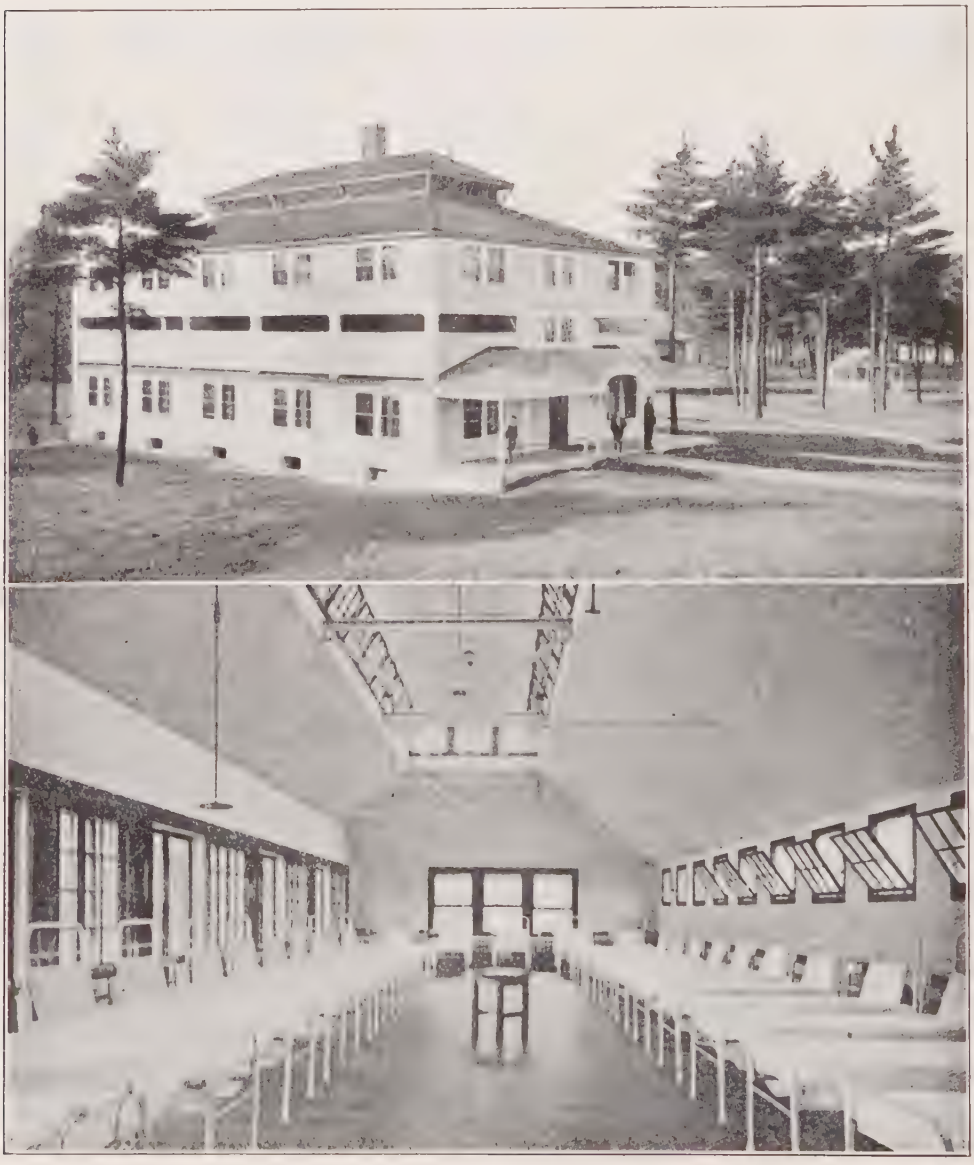
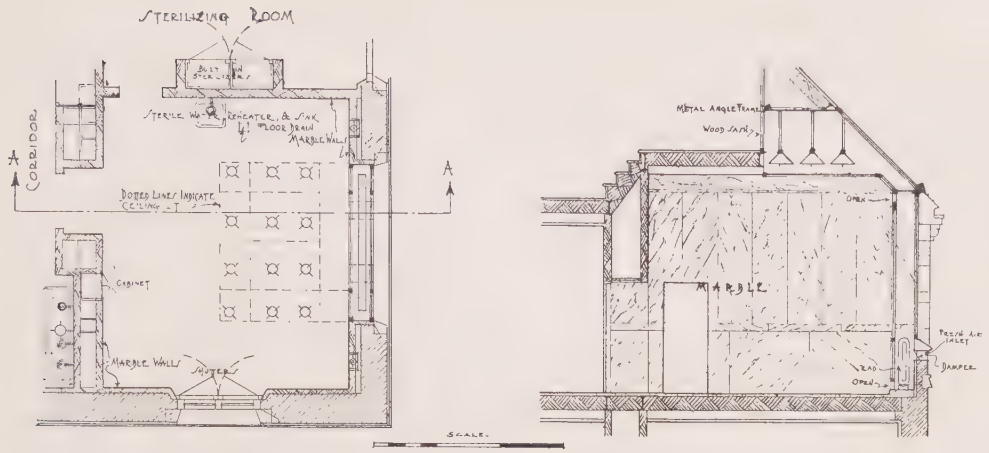


FIG. 388. HOSPITAL SCHOOL AT CANTON, MASS. SHOWING ROOF VENTILATION.



PLAN OF OPERATING ROOM — SECTION THRO' OPERATING R.M. ON LINE 'AA'

ROSS PAVILION ~ ROYAL VICTORIA HOSPITAL
MONTREAL, QUE.

FIG. 389.

be set close to the fixture, and have a removable strainer for cleaning. Few medical institutions, even, have traps accessible in this way. And still how important this feature is! Of course every trap should be vented or have some anti-syphon device, but the local plumbing law generally governs this feature.

FIG. 390. SURGEONS' SCRUB-UP IN OPERATING SECTION, QUINCY CITY HOSPITAL, QUINCY, MASS.

Overflows constitute another filthy, unhygienic condition that exists in nine out of every ten bowls, sinks, or bathtubs in general use. These are generally built integral with the china or iron, never smooth at best, and rarely get-at-able in any way. The construction of all bowls and sinks should be simplified by the use of the celluloid standpipe, which is light and easily cleaned; or the full, open overflow, with strainer, or similar device. In the double sink, if the partition is a little lower than the sides, one sink serves as an overflow for the other.

The washing in running water, required by certain religious sects, is really the ideal of cleanliness.

The *piping* requiring polishing should be reduced to a minimum, for the care of brass work is a considerable item of expense in a large institution. Where polished brass is desired, yellow metal should be specified. Heavily nickel-plated pipes and fixtures wear well. Pipes and fittings finished in white enamel, properly applied, are very satisfactory. The traps and less conspicuous

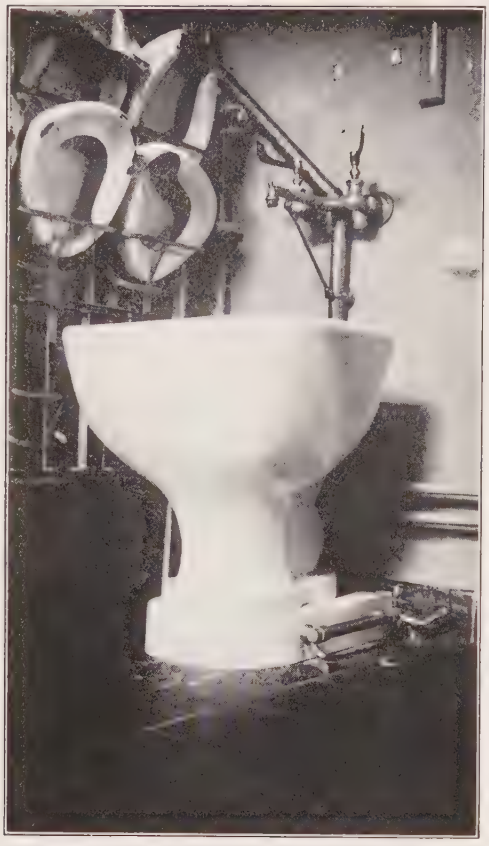


FIG. 391. SLOP SINK, WITH FOOT PEDAL FOR FLUSHING.

parts may be bronzed or painted, saving considerable expense.

The new type *watercloset,* hung from the wall (where the construction will permit), is a great improvement over the old styles, and is being used in many institutions. The material selected for seat is important; if covered with celluloid or some other acid-resisting substance and cut away in front, it is much more hygienic. The cover, as a rule, should be omitted. The flushing can be accomplished either by a flushing valve, low-down or high tank so long as it works properly. The water seal, quiet action, and appearance are all questions to be considered.

The *slop sink* in the work room is used largely for the emptying and cleansing of bed pans and urinals, and the fixture should be so planned that this can be accomplished quickly and easily. To do this, the hopper must have a large, unobstructed outlet like that of the watercloset; it should slope quickly to the outlet; means of cleansing the inside must be provided, either by a flushing rim or a short piece of flexible hose, or both, the hose being the simplest method of cleansing the inside of the utensils. The fixture should be set

FIG. 392. BATH IN ADMITTING ROOM, ISOLATION BUILDING, ST. LUKE'S HOSPITAL, JACKSONVILLE, FLA.

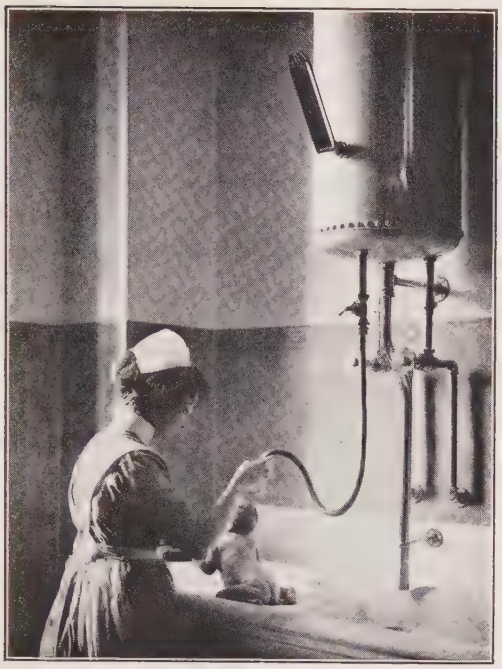


FIG. 393. BABY BATH.

high enough so that the work can be done without stooping. If a sterilizing hopper is wanted, secure one in which *all* the contents can be sterilized, and one which can be easily cleaned and repaired.

Many of the so-called "clinic" hoppers are simply a complicated mass of valves, pedals and sprays, which need a mechanician to operate and keep in order. The simpler the fixture (Fig. 391), the more effectual it is.

Fig. 391 shows a siphonic action hopper, which retains a large body of water in the bottom, so as to give a thorough flushing. It has a flushing rim, actuated by a pedal.

Bath tubs for patients should be set up from the floor for two reasons—facility of cleaning underneath, and ease in bathing if nurse or attendant needs to assist. The inlets should be large, allowing the full discharge of hot and cold water at the same time. The type of inlet used on ocean steamships allows of quick filling. The overflow, if any, should be easily cleaned; but in most cases, there is no need of an overflow. A plug or standpipe and not a "flow-back" form of concealed standpipe should be used. The celluloid standpipe, which is light and easily cleaned, is less likely to cause damage if dropped.

It is the opinion of many hospital administrators that the only way to be sure that a patient is thoroughly bathed is to use some form of shower bath. This may be a shallow tub or bathing slab, set high but within easy reach of the attendant, the patient being washed in clean, running water by means of a hose and spray, the tub or slab becoming merely a drain for the water. In this way all of the dirt goes directly to the drain and is not diluted and used again on the body. This form of bath (Fig. 392) should be used with entering patients, particularly in the contagious and children's departments. In many of the European hospitals for women this form

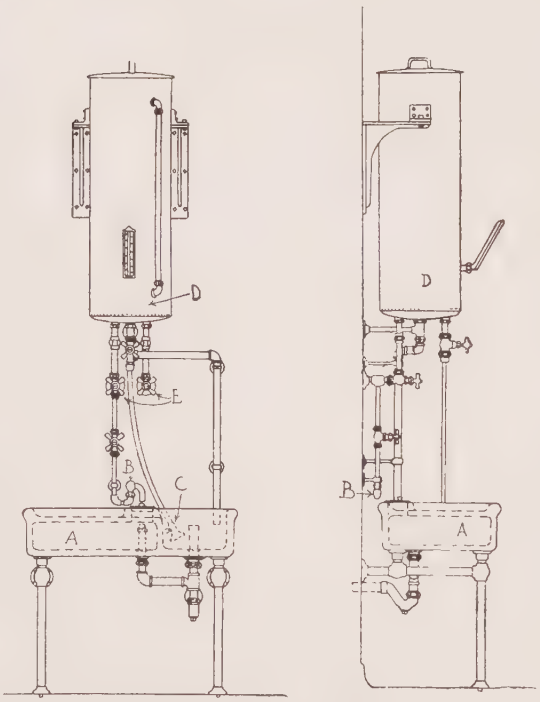


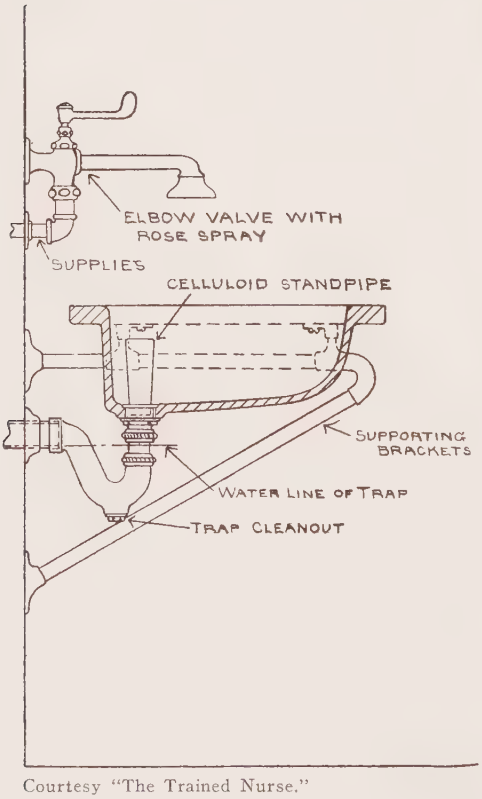
FIG. 393A. DETAIL OF BABY BATH.

A—Hot water compartment for heating slab.
B—Hot water swing joint to fill compartment A.
C—Flexible hose with self-closing spray.
D—40-gallon storage tank, with thermometer and gauge glass.

is the only one used. The same principle serves in the portable tub (Fig. 203) described in Chapter IV. Provision must be made in the plumbing, however, where this form is used, for a suitable floor drain and a hose connection to the room fixture.

The principle of the high, shallow tub or slab is quite generally used in bathing children (Fig. 393) and infants. In both cases some reliable temperature-controlling device should be placed on the supply or a separate storage tank placed directly above the bathing slab. This tank should have a visible thermometer and water gauge. The use of the spray can be facilitated where there is a storage tank by using a self-closing spray head.

The infants' bath is naturally smaller than the children's, and the slab may be heated by admitting hot water to the closed space in the porcelain directly under the slab.



Courtesy "The Trained Nurse."

FIG. 394. DIAGRAM SHOWING CONSTRUCTION OF LAVATORY.

FIG. 395. LAVATORY FOR WARDS AND PRIVATE ROOMS, WITH WRIST VALVES.

The *Wash bowl* or lavatory now placed without restraint in the patients' rooms and the open corridor, as well as in the toilets and wash rooms, should be designed on the same simple lines suggested

FIG. 396. TYPICAL LAVATORY FOR PATIENT'S ROOM.

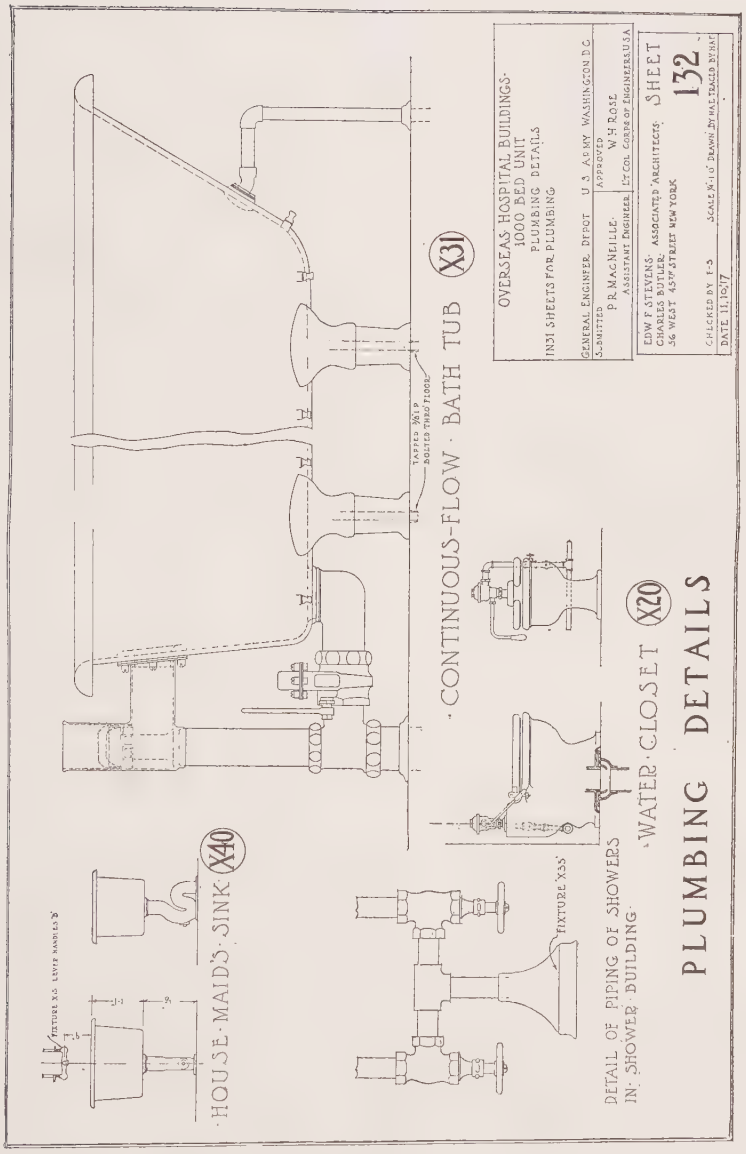

PLUMBING DETAILS
HOUSE-MAID'S-SINK (X40)
CONTINUOUS-FLOW-BATH TUB (X31)
WATER-CLOSET (X20)
DETAIL OF PIPING OF SHOWERS IN SHOWER BUILDING
FIXTURE X35
OVERSEAS HOSPITAL BUILDINGS-1000 BED UNIT
PLUMBING DETAILS
IN31 SHEETS FOR PLUMBING
GENERAL ENGINEER DEPOT U.S. ARMY WASHINGTON D.C.
SUBMITTED P.R. MAC NEILLE ASSISTANT ENGINEER
APPROVED W.H. ROSE LT.COL. CORPS OF ENGINEERS U.S.A.
EDW. F. STEVENS, CHARLES BUTLER, ASSOCIATED ARCHITECTS, 56 WEST 45TH STREET NEW YORK
SHEET 132
CHECKED BY F.S.
SCALE 1-0 DRAWN BY MASTRACED BY
DATE 11/10/17

FIG. 397.

PLUMBING FIXTURES DESIGNED FOR ARMY HOSPITALS.

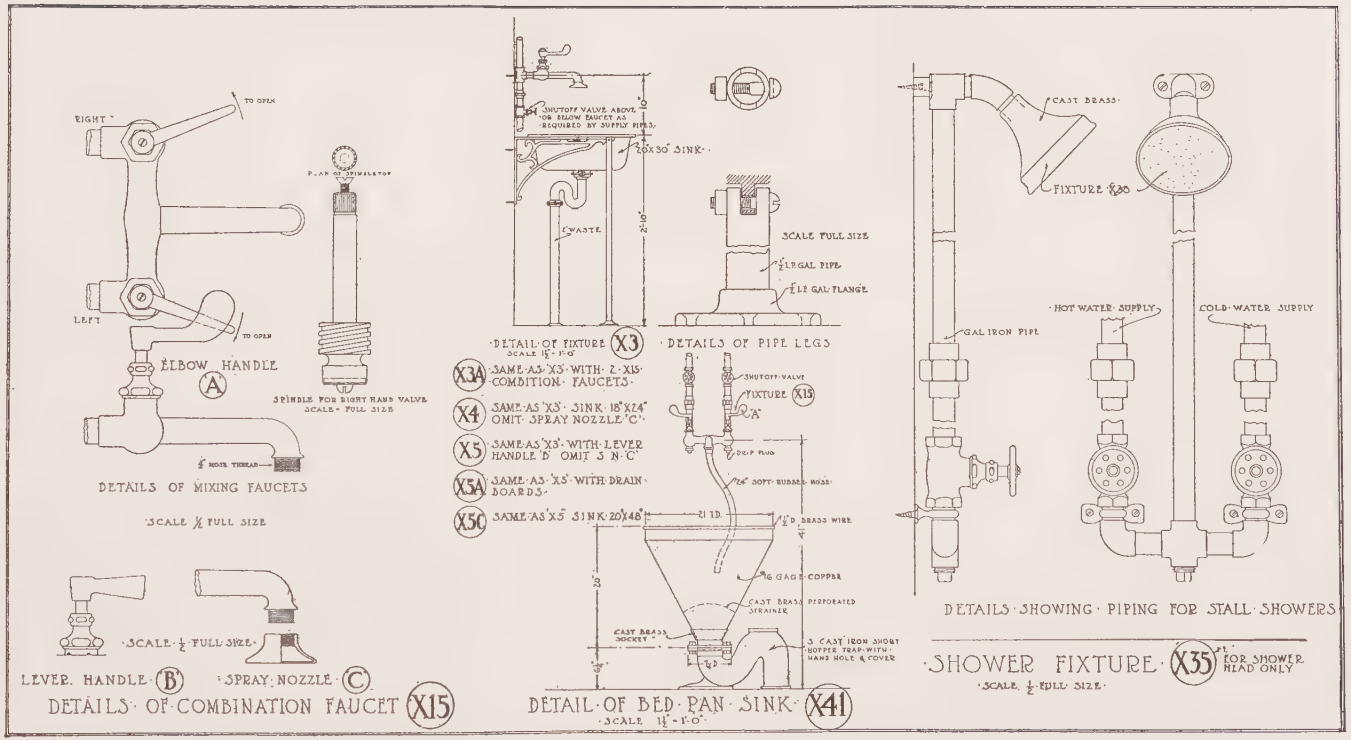

RIGHT
TO OPEN
LEFT
TO OPEN
ELBOW HANDLE
A
SPINDLE FOR RIGHT HAND VALVE
SCALE - FULL SIZE
DETAILS OF MIXING FAUCETS
SCALE ½ FULL SIZE
SCALE ½ FULL SIZE
LEVER HANDLE B
SPRAY NOZZLE C
DETAILS OF COMBINATION FAUCET X15
SHUTOFF VALVE ABOVE OR BELOW FAUCET AS REQUIRED BY SUPPLY PIPES
20 X 30 SINK
WASTE
DETAIL OF FIXTURE X3
SCALE 1½" - 1'-0"
X3A SAME AS X3 WITH 2 X15 COMBITION FAUCETS
X4 SAME AS X3 SINK 18" X24" OMIT SPRAY NOZZLE C
X5 SAME AS X3 WITH LEVER HANDLE D OMIT S N C
X5A SAME AS X5 WITH DRAIN BOARDS
X5C SAME AS X5 SINK 20" X48"
SCALE FULL SIZE
½" GAL PIPE
1½ GAL FLANGE
DETAILS OF PIPE LEGS
SHUTOFF VALVE
FIXTURE X15
A
DRIP PLUG
¾" SOFT RUBBER HOSE
21 ID
½" D BRASS WIRE
16 GAGE COPPER
CAST BRASS PERFORATED STRAINER
CAST BRASS SOCKET
3 CAST IRON SHORT HOPPER TRAP WITH HAND HOLE & COVER
DETAIL OF BED PAN SINK X41
SCALE 1½" - 1'-0"
CAST BRASS
FIXTURE X35
GAL IRON PIPE
HOT WATER SUPPLY
COLD WATER SUPPLY
DETAILS SHOWING PIPING FOR STALL SHOWERS
SHOWER FIXTURE X35 FOR SHOWER HEAD ONLY
SCALE ½ FULL SIZE

FIG. 398.
PLUMBING DETAILS DESIGNED FOR ARMY HOSPITALS.

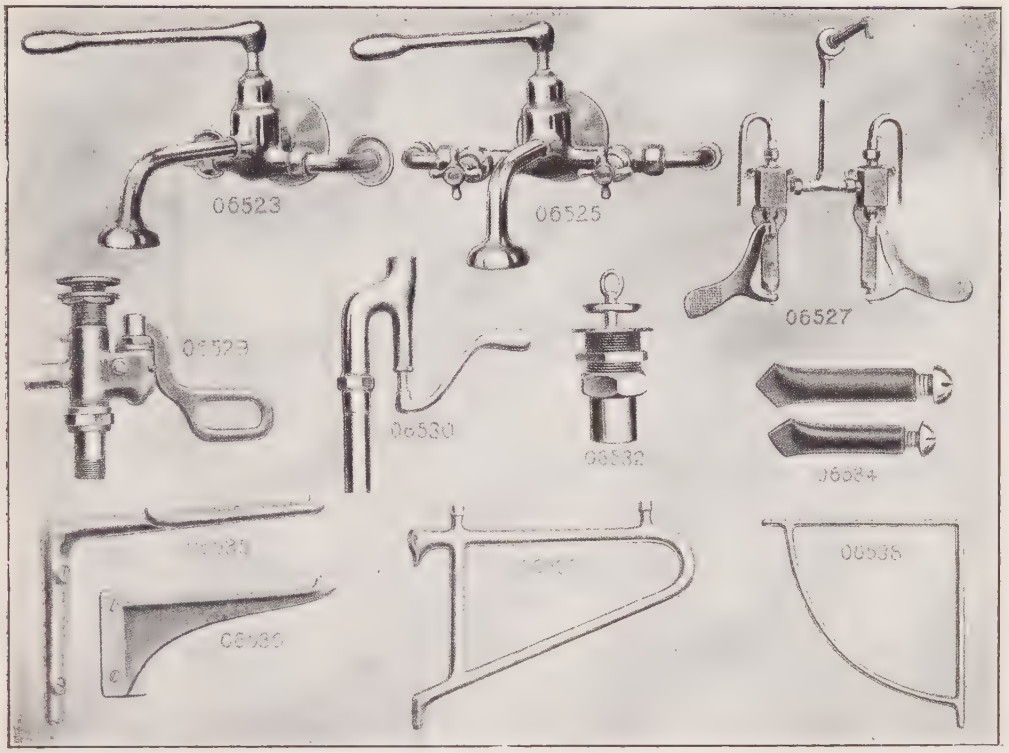


FIG. 399. A PAGE FROM A SWISS PLUMBING CATALOGUE.

for other fixtures. The non-concealed overflow, the removable strainer, and the high trap, all are desirable features; in fact, in nine cases out of ten the stopper can be eliminated if a combination faucet is used; for, once accustomed to washing under running water, the filled bowl and washing in dirty water will be abandoned.

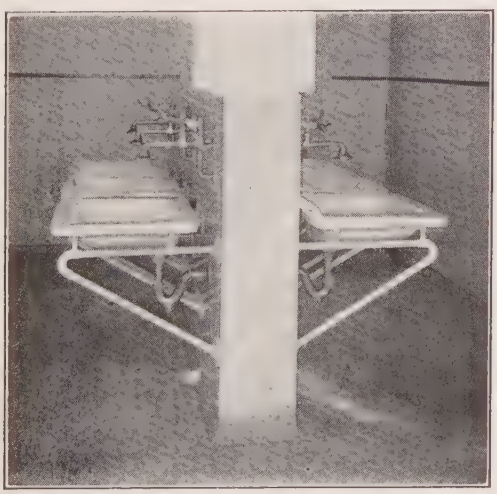


FIG. 400. SURGEONS' SCRUB-UP, OHIO VALLEY GENERAL HOSPITAL, WHEELING, W. VA.

For ward bowls, bowls in corridor, and bowls for scrubbing up for dressings, the wrist or elbow mixing-valve may be used to advantage (Figs. 395, 396).

Where it is desirable to fill the bowl, a standpipe of celluloid, made to fit the opening, gives an easily cleaned overflow.

Fig. 394 shows the construction of such a lavatory.

Fig. 395 shows a simple, inexpensive lavatory, with a combination faucet having quick-movement valves, and an elbow or wrist handle. The trap is close up, the overflow not concealed. This is adapted for general use, or for scrub-up purposes. Another good lavatory is shown in Fig. 396.

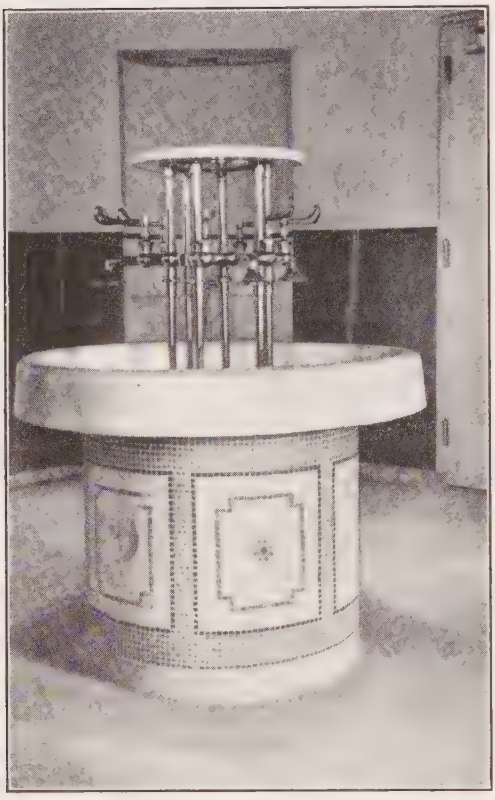


FIG. 401. SURGEONS' SCRUB-UP, CHOATE MEMORIAL HOSPITAL, WOBURN, MASS.
Edward F. Stevens, Architect.

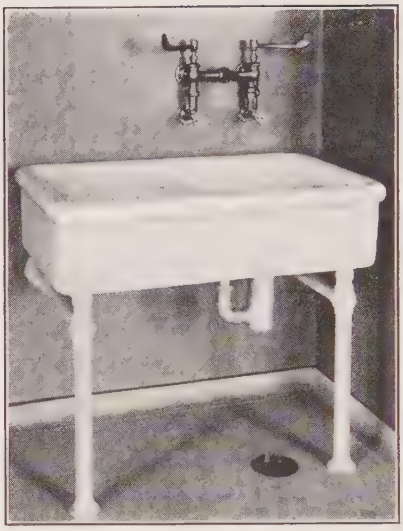
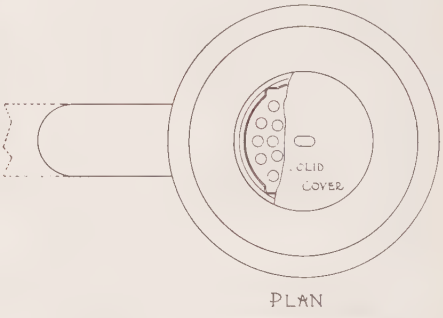
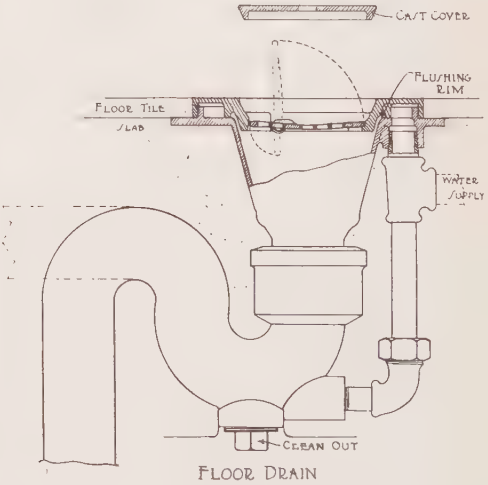


FIG. 402. SINK FOR ISOLATION WARDS, SHOWING ELBOW VALVE AND FLOOR DRAIN.



PLAN



FLOOR DRAIN
FIG. 403.

FIG. 404. AUTOPSY TABLE, SHOWING DRAIN TOWARD OUTSIDE OF FIXTURE.

FIG. 405. MARBLE AUTOPSY TABLE, WITH SINK ATTACHED.

Figs. 397 and 398 show several simple plumbing devices which were planned to be used in the United States overseas army hospitals. Special attention is called to the continuous-flow bath tub (X 31) and to the simple combination faucet X 15.

The scrub-up for the surgeon, as a preparation for operation, has undergone various changes: from the foot valve, good at times but depending on an even-pressure of the foot of the surgeon to produce an even flow of an even temperature; then various forms of the knee valve, dependent upon a mixing valve for the temperature, without regulation of flow; up to the simpler elbow or forearm control. Again we find that the work of the European specialists has given us models from which to work. A page from a Swiss plumbing catalogue (Fig. 399) shows a variety of simple forms of both foot and elbow action valves. For the scrub-up for a number of surgeons, the long sink with several sets of outlets has proved satisfactory. Single bowls, set together on one central screen, as at the Ohio Valley General Hospital (Fig. 400) or the Youngstown Hospital, allows of easy access. In the smaller hospital this same idea may be carried out with a raised basin in the center of the operating rotunda, as at the Charles Choate Memorial Hospital (Fig. 401); for, with the combination non-hand-touching valve, all that is needed is sufficient spillway for the water. This form of scrub-up valve placed over the work-room sink gives an additional place for washing. It may be placed over a simpler sink in infectious wards, allowing for the special cleansing of the nurse's hands and the giving of the baths in the portable tubs (Fig. 402). (See Chapter VII.)

The *floor drain*, highly important in certain sections, may be a menace to health unless properly constructed and kept filled with water. For operating and autopsy rooms a flushing rim trap is desirable. This top should be solid,

to resist the movement of heavy furniture (Fig. 403).

The *autopsy table* is generally made a part of the plumbing, and a simple fixture which has proved satisfactory is shown herewith (Figs. 404 and 405). The center is the highest part, allowing the fluids to flow away from rather than toward it. A small sink, made integral, is provided. A simple means of flushing is obtained by using a flexible hose pipe, into which a copper wire is inserted. By means of this the end of the hose may be made to remain in whatever position it is placed, allowing the flushing action to go on without interruption.

The *drinking water* problem of the hospital has been solved in various ways by various hospital men. There should be a goodly supply of pure water easily procurable for the patient, for the nurse, for everybody.

The system used by the writer at the Ohio Valley General Hospital and at the Royal Victoria Hospital is to distill all the water for drinking and clinical purposes.

On each floor outlets were provided where the water is cooled, installing a fountain for patients' use (Fig. 406).

This fountain is provided with an outlet for drawing water into a receptacle as well.

FIG. 406. "BUBBLING" DRINKING FOUNTAIN, FOR HOSPITAL CORRIDORS.

Details of Construction and Finish

CHAPTER XVII.

The exterior details of the hospital should be made to conform to the style of architecture in which the building is designed and should be left to the architect, it being borne in mind that the detail and exterior treatment should be subservient to the plan; in other words, the exterior should be designed around the plan, and not the plan made to suit the elevation as is so often the case. Economy in construction can be realized by establishing units in the planning, by having the partitions continuous and the plumbing of one story near that of the others.

The interior finish, especially in the patients' rooms, should be carefully studied from the economic and hygienic sides. Projecting surfaces are difficult to keep clean and should be eliminated as far as possible. If the door jambs are made of steel pressed to a suitable form, with angles rounded, and are set to form a ground for the plasterer, there will be no projection. To avoid the usual sharp angle at the junction of the door jamb and the floor, the door stop should be omitted for a few inches above the floor and the coved base allowed to run through the jamb (Fig. 407). If the door jamb is of wood, the same general detail can be used; and to protect against the slight sinkage of plaster, a small oval wood or metal strip can be used (Fig. 407A). Transoms, where used, may be the thickness of the door, and the usual projection avoided.

Fig. 408 shows the detail of a door frame in a thin (two-inch) solid partition. It can be used to advantage in separation between rooms, or in storeroom partitions.

The base around the rooms can be made of the floor material or of tile, marble, metal, wood, or any enduring material, depending on the appropriation and the individual preference; but if coved at the juncture of wall with floor, made flush with the wall line, and carried through the door jamb of the same material, the hygienic qualities are enhanced. To prevent the furniture from marring the walls, a furniture shoe formed in the base, three or four inches from the wall, can be used to advantage. Bases and door jambs of this type are set before plastering, so that every part of the finish is smooth with the wall.

Windows should be placed low enough so that a patient in bed can readily see out upon the street. The same character of finish should be applied to windows as to doors. It has been found that the direct draft from a slightly opened window may be diverted if a deflector is placed in front of the opening. This can be formed in the window frame and so become permanent (Fig. 409).

The "full-view" casement window shown in Figs. 410 and 410A is particularly adapted for solaria and for airing balconies which it is desired to close occasionally. This method of hanging permits the sash to be opened about 80 per cent. of the whole, giving practically the effect of a wide-open balcony. The sashes opening out simplifies the screening problem, since it may be accomplished with sliding screens.

Fig. 411 shows a window of which the special advantage is that it has a hinged sash swinging in, with a cheek piece at either side, so that the incoming air is deflected toward the ceiling. This window was originally designed for war hospitals, but is equally adapted to permanent structures. It is suited to any sort of ward or room, and is excellent for crowded wards where it is difficult to secure ventilation without drafts.

Its disadvantage is the difficulty of getting at outside blinds or screens; but by placing a small sash at the bottom, as in cut, access is gained to outside blinds, awning adjusters or screens; this may also become a bottom ventilator.

The hardware required for it is of the simplest sort; two friction hinges, and a snap catch on each section, and at the side a chain to keep the sash from going beyond the horizontal, with a screw hook to catch a link of the chain if one wishes to drop it only part way.

All *angles,* whether wall, floor or ceiling, should be coved.

Doors should be smooth, without moulding. The no-panel slab doors are desirable; or if these prove too expensive, the one panel, or at most two-panel, door can be used. All doors of wards, patients' rooms and balconies should be wide enough to permit the passage of a bed.

Fig. 412 shows the construction of a pivot door which may be used to close alternately two adjoining doors. Its special use is in intercommunicating baths between two private rooms, as in Fig. 58.

Walls back of all plumbing fixtures should be tiled, with the tile on the same surface and even with the plaster. The walls of toilets, sink rooms, serving kitchens, laboratories, and similar rooms subject to much use, should if possible be tiled to a height of five feet or more.

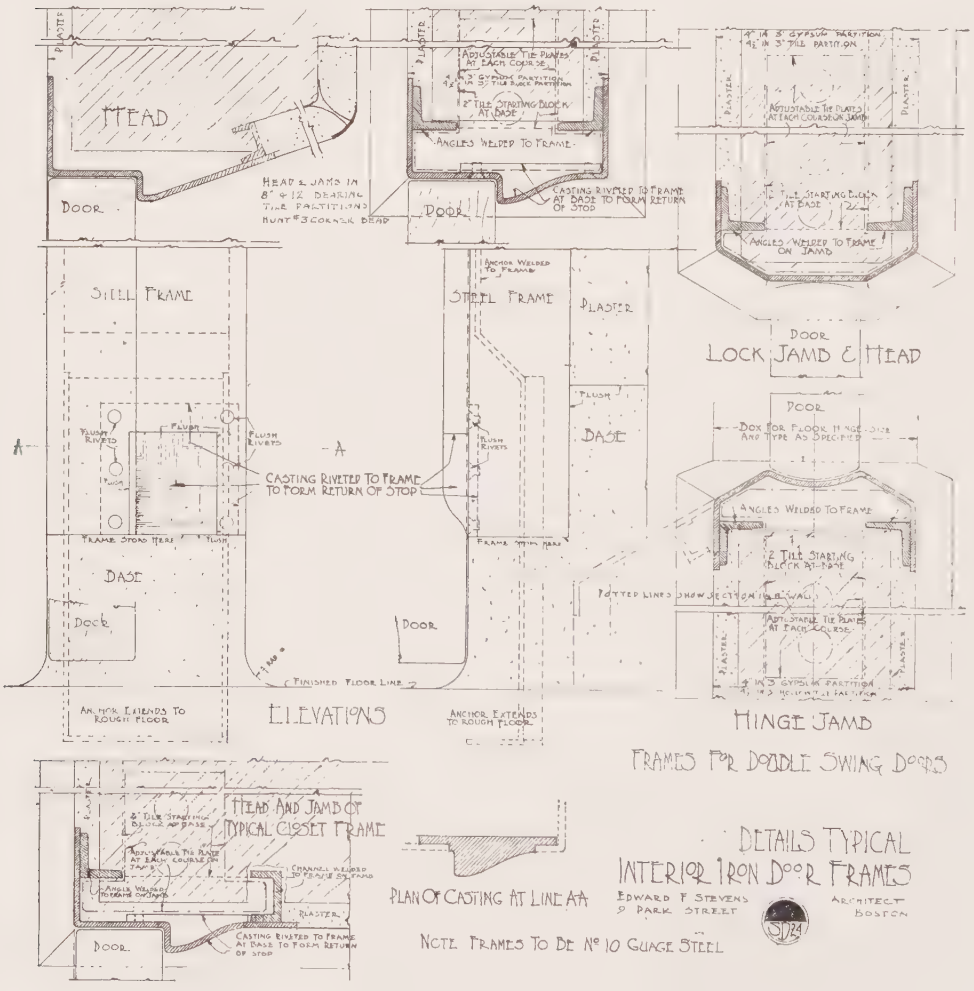


FIG. 407.

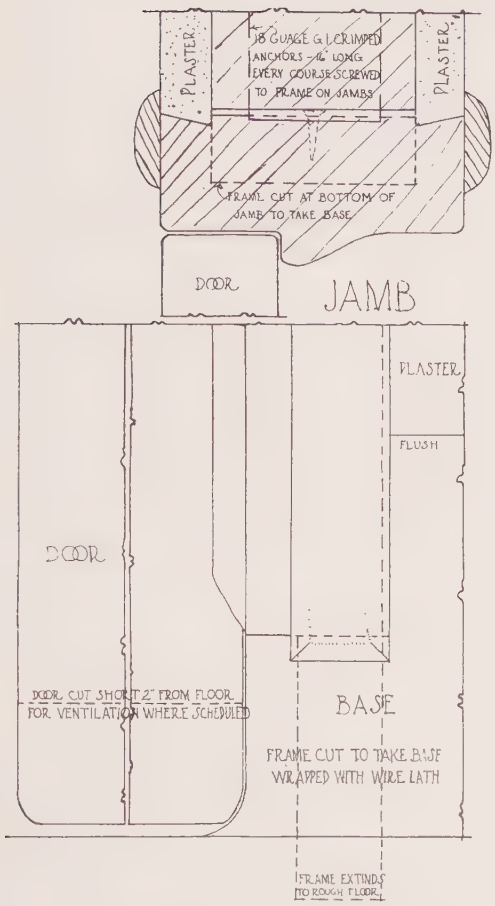

PLASTER
18 GUAGE G.I. CRIMPED ANCHORS 4" LONG EVERY COURSE SCREWED TO FRAME ON JAMBS
PLASTER
FRAME CUT AT BOTTOM OF JAMB TO TAKE BASE
DOOR
JAMB
PLASTER
FLUSH
DOOR
DOOR CUT SHORT 2" FROM FLOOR FOR VENTILATION WHERE SCHEDULED
BASE
FRAME CUT TO TAKE BASE WRAPPED WITH WIRE LATH
FRAME EXTINDS TO ROUGH FLOOR

FIG. 407A. WOOD DOOR JAMB

Medicine closets for each unit (Fig. 413), built into the wall, should have no re-entering angle. They should have a small sink, with hot and cold water, and slab, with tiling at the back, shelves of plate glass or metal, artificial lights, towel rack, etc. If the unit is small, a built-in medicine closet at or near the corridor bowl can be substituted (Fig. 414).

The *clothes closets* for private rooms or wards (Fig. 387) should be built like the medicine closets. If the closet door is cut two inches short at the bottom, the vent for the room may be placed in the closet ceiling, and the ventilation of both room and closet accomplished. (See chapter XVI on heating and ventilating.)

Fixed equipments such as *linen closets, kitchen cabinets,* etc., should be constructed so as to leave a free space behind them. The linen closets should have open shelves or racks, so built that they are removable for cleaning (Fig. 415); if the top is sloped, the minimum amount of dust is accumulated (Fig. 416).

Fig. 417 shows a booth designed for the giving of nasal and throat treatments in the out-patient department. Its size is but 3 feet 8 inches by 4 feet 6 inches. The screen partition is of metal, enamelled, the table top of the same material. There is an electric instrument sterilizer, an adjustable lamp, a special small bowl with running water, a rack for bottles, an extra shelf for supplies, etc.

Hardware is a small but very important item, and should be carefully selected with an eye to its suitability for hospital purposes. Unsuitable, noisy hard-

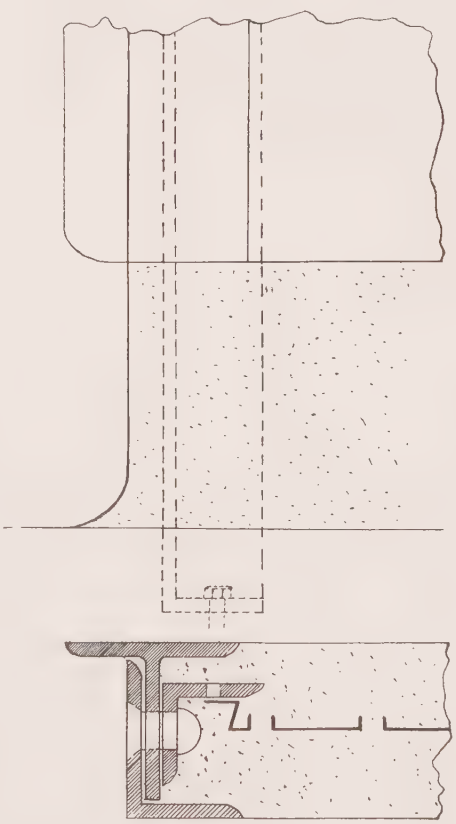


FIG. 408. METAL DOOR JAMB FOR 2-INCH SOLID PARTITION.

ware has been the cause of more disturbance to patients in an institution than almost any other item in the construction. How often one sees the latches "muzzled" with a towel or special pad which slips around the knobs, or covered weights placed behind the door to prevent slamming! Hardware suitable for a dwelling, an office building, or a theatre is not suitable for a hospital.

How often the nurse, with both hands full, is annoyed and delayed in opening the door with the round knob! And how often the closing of the same door awakens or annoys the patient!

Door knobs are also a definite source of infection. They are particularly dangerous where cases of communicable disease are cared for.

The opening of the door with both hands full can be accomplished with the angle door handle, and this is a good device where noise does not enter into the problem, as in service buildings; however, in psychopathic wards the handle should have no shank and should be turned down instead of up.

With an efficient checking spring and noiseless door holder, the latch bolt can be eliminated, and with it much of the noise from hardware; then, with the reversed *hook handle* (Fig. 418) placed on the inside of the door, one can open the door, with both hands filled, by slipping the forearm under the hook handle; and of course, with the latch eliminated, the door can be readily pushed open from the outside. For the

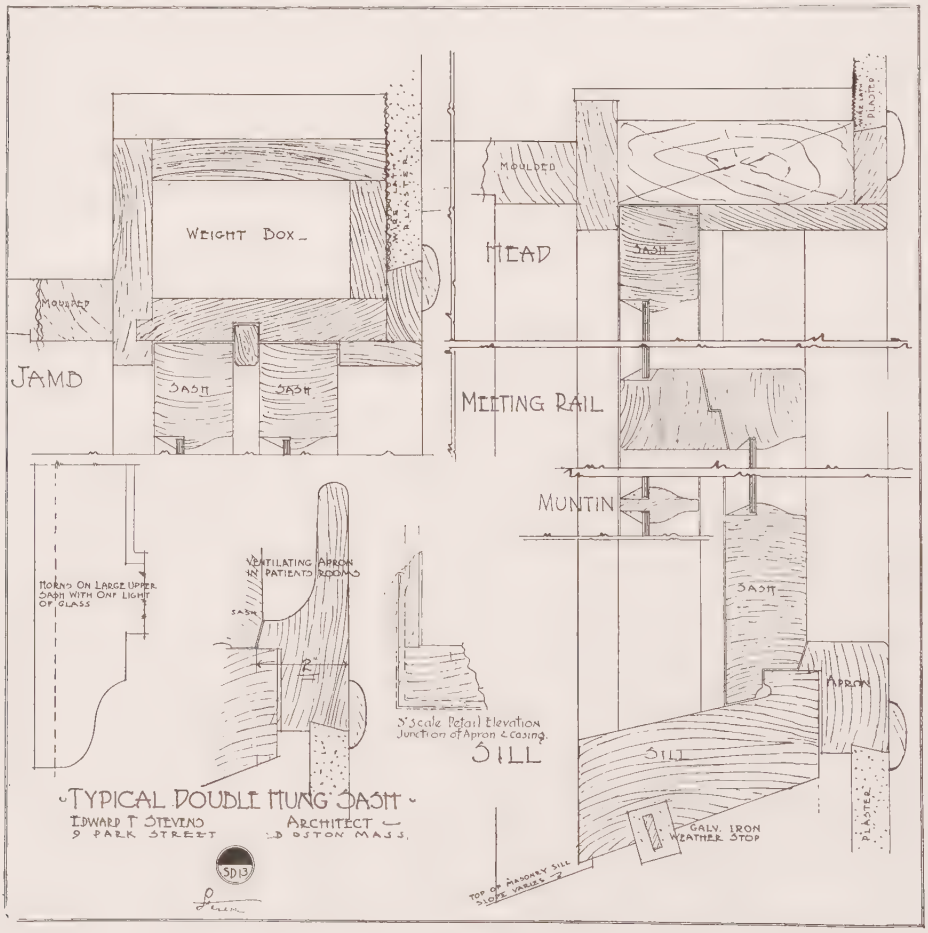


FIG. 409.

occasional locking of the door, a dead bolt can be installed.

The hardware for the elevator doors should always run smoothly and afford protection against opening of doors when car is away from landing, but the silent feature should be emphasized in selecting this hardware.

With reference to *floors,* the persistent question "What is the best floor" is hard to answer. Among the leading architects and hospital men in Europe, the writer found the almost universal preference to be for tile, usually a light gray flint or vitreous tile, as large as four inches, laid with a fine joint and against a coved base of the same material. In America, with every available material and numerous advocates of each, it becomes almost a case of individual preference. There are certain underlying principles, however, which should be considered:

(a) Fitness for location.
(b) Durability.
(c) Artistic effect.

The patients' room should have some resilient material, quiet in color and reasonably non-absorbent; resiliency and durability should be considered for the corridor; and durability and non-absorbent qualities for the utilities.

Good results may be obtained with hardwood floors and perhaps they are as popular today as any other floor. With the fireproof buildings, however, the demand is for a floor of fireproof material.

Of the monolithic floors, terrazzo gives perhaps as good results as any simple, inexpensive floor; two colors may be used, one for the base and border and one for the field, with a dividing line

FIG. 410. FULL VIEW WINDOW.

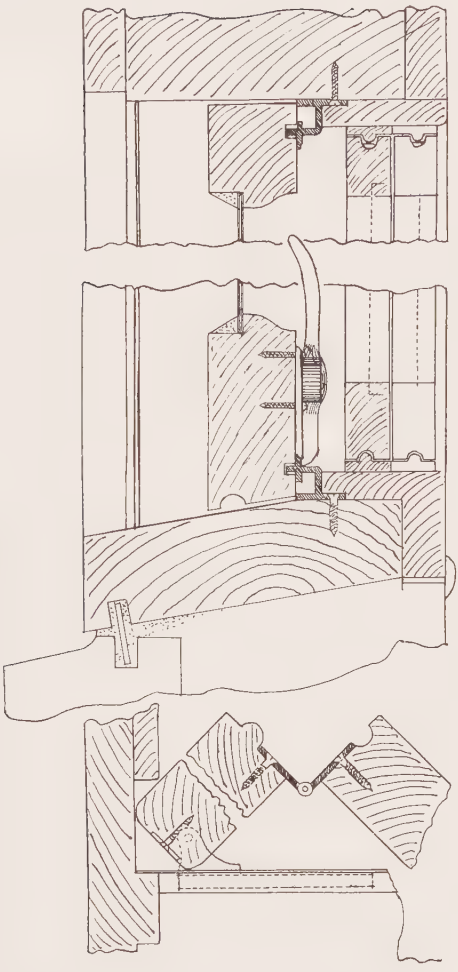


FIG. 410A. FULL VIEW WINDOW DETAIL.

between of single marble tessarae. Some of the magnesite floors are giving good results, when properly laid. This can be put down in contrasting colors and the artistic effect is pleasing. Under certain conditions—for example, when laid in kitchens and toilets, where very hot water may be spilled—this material is apt to disintegrate and to spot badly.

Quarry tile makes a good wearing floor in the service part of the hospital and for roof wards and airing balconies, and is artistic as well.

Where strict economy must be practiced, a good quality of cement floor, properly treated to prevent dusting, serves its purpose well.

All the asphalt floors should be avoided excepting for special places like portions of laboratories, refrigerators, etc., where an acid-proof floor is required.

Hard, fine-grained marble makes a most excellent operating room floor. Opalescent glass has been used more or less successfully for the same purpose.

For corridor floors, where there is much traffic, probably the best material is pressed cork tile. This is quiet, resilient, and wears well. Cork tiling and rubber tiling have been used in toilets and baths, but they possess little advantage over terrazzo or magnesite.

For wards and private rooms, wood floors are cheap and look well, but are open to many objections. They shrink and swell, have many cracks to gather dust, and need constant refinishing. Maple is undoubtedly the best wood floor material for a hospital.

Almost everywhere in Europe linoleum is used for the floors of patients' rooms and wards, and its use is growing in favor in this country. It can be used not only for floors, but for stair treads, table tops, screens, and even for door panels. When properly laid, it is doubtless the most satisfactory material which can be found. Great care must be taken to have the floor underneath smooth and dry, and the material must be thoroughly stretched and laid upon the floor for several days before being fastened down, then cemented to the construction, the cement being applied to the entire under surface. If the newer colors and patterns of linoleum are used, the effect is very pleasing.

Too much care cannot be taken in the planning and arrangement of *artificial illumination*, especially for the rooms occupied by patients. The eye, at all times a delicate organ, becomes more sensitive in sickness. Beds should be so placed as to shield the patients' eyes in the daytime, which means that they should not face the windows. In open wards, this is avoided by the use of cross screens, as shown in the Bridgeport Hospital (Fig. 69) and in St. Luke's Hospital (Fig. 152). For night lighting, direct ceiling lights should be avoided; instead, re-

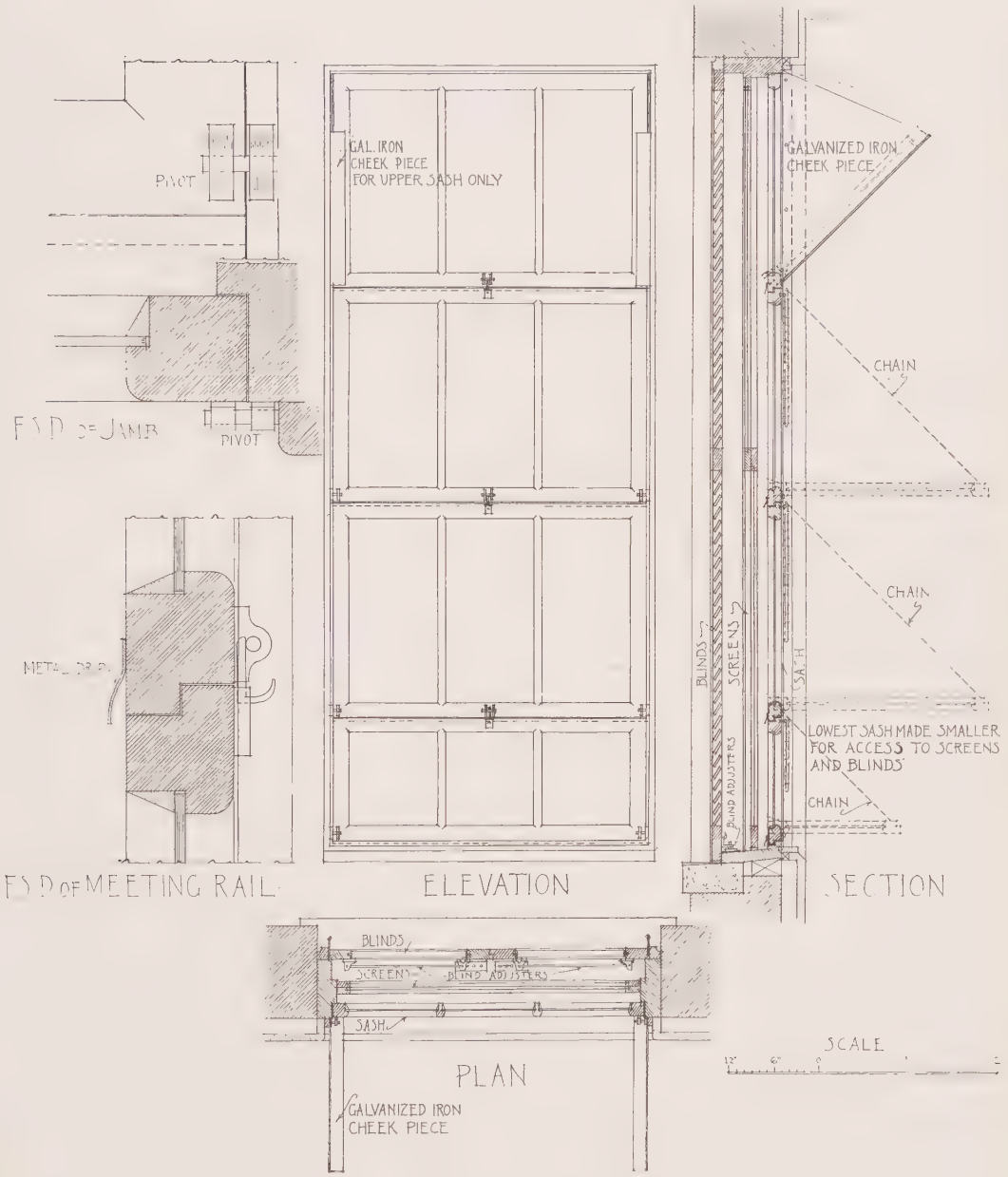


FIG. 411. DETAIL OF WINDOW USED IN ARMY HOSPITALS.
Charles Butler, Architect.

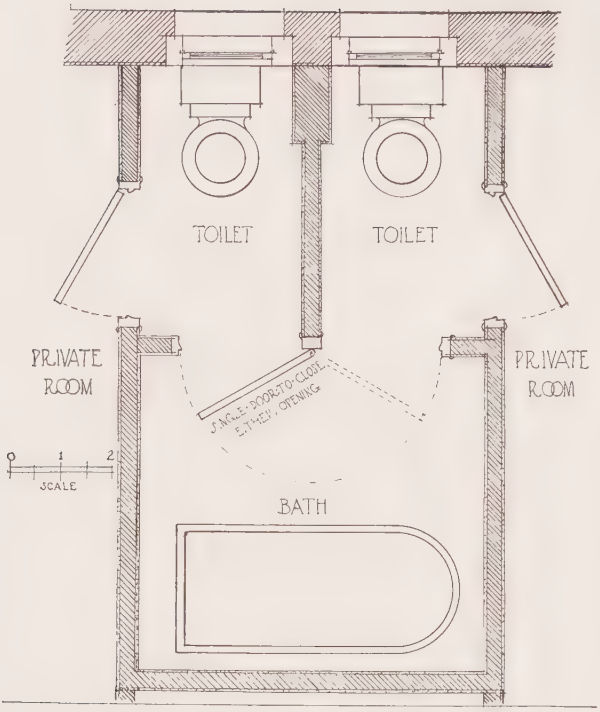


FIG. 412. PIVOT DOOR SEPARATING BATH FROM TOILETS IN PRIVATE SUITE.
Edward F. Stevens, Architect.

flected or obscured lights should be used, which give a soft glow over the whole room, with no bright spots. These ceiling lights can have lamps for greater or less illumination in the same fixtures; and with the low candle power lamps used for night service, the lamps can be rendered less disturbing to the patient by dipping in blue stain. The fixture placed near the ceiling, with an opaque or opalescent reflecting globe placed below the light, directs all the rays to the ceiling, and thence diffuses them through the room. The bowl-shaped fixture should be covered with a tightly fitting sloping glass top to keep out the dust and to allow of its easy removal (Fig. 419). A most attractive fixture is made by having the lower globe double, and interposing fabric similar in coloring to the curtains and covering of furniture.

In addition to the ward or room lighting, there should be a wall outlet at each bed, where a portable table or wall lamp can be attached (Fig. 420). The wall outlet may be used also for an electric fan, electric heating pad, etc.

The artificial illumination of *operating rooms* needs most careful study. Rooms have been successfully lighted by rows of lights around the outer wall or on the ceiling near the wall; by a more concentrated light in the center with a bowl-shaped reflector; or by a fixture with several arms wide apart, so placed as to overcome shadows. A large fixture over the operating table is to be avoided on account of its tendency to catch and distribute dust; and if a central light is used, the swinging crane is to be preferred. This can be raised or lowered, or swung entirely out of the way when not in use (Fig. 421).

Concentrated light from powerful reflectors placed above the ceiling light gives very satisfactory results. (See Fig. 389.)

Fig. 422 shows an operating light which is a combination of direct and reflected rays. By placing these lights in at least four parts of the ceiling, one avoids having any fixture directly over the operating table, does away with the intense heat generated by high-power lamps, and practically eliminates shadows.

It is well to provide gas for an emergency light in the operating room. The enclosed drop mantle burner is satisfactory for the purpose. Emergency lights have been successfully made by the use of the Prest-o-lite tank, mounted on a portable tripod and surmounted by a reflecting lamp (Fig. 136).

A goodly supply of hand electric torches should be kept at the nurses' stations against need.

The Tungsten or Mazda lamp facilitates illumination, giving the maximum amount of light with a minimum amount of current.

For lights in the offices, kitchens, etc., nothing special is needed, except to se-

cure a fixture which has simple lines and from which all dust-catching ornamentation is omitted and which will give proper illumination.

The therapeutic effect of the *color of walls, ceilings, and finish* is very marked upon patients. There is, perhaps, no one thing in the details of a hospital which should have more study than the wall and ceiling decoration or color, not only of the patients' rooms but also the entrance, the reception rooms, the sitting room, and even the kitchens and work rooms. Why should the patient of refined taste, accustomed to harmonious colors in furniture and walls at home, be subjected to ugly, inartistic hospital rooms? The walls should be of cheerful colors; the decorations, if any, should be

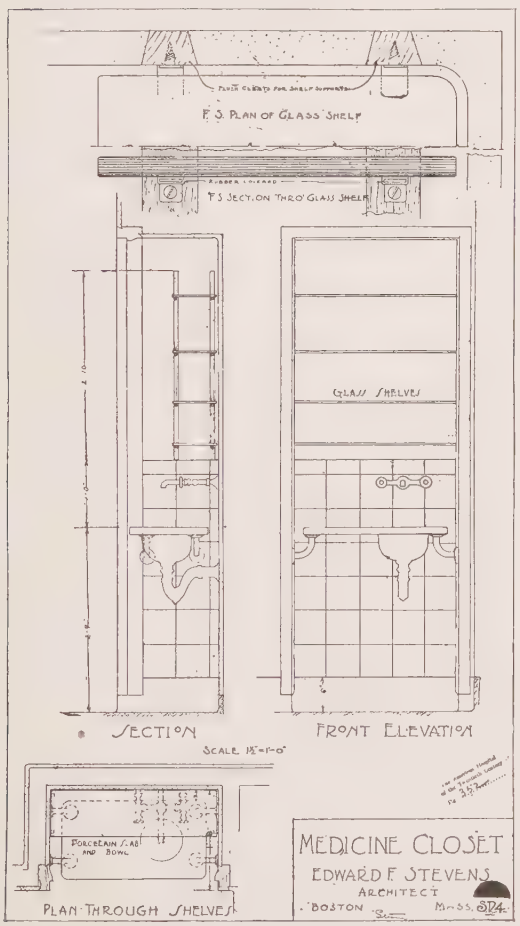


FIG. 413.

FIG. 414. MEDICINE CLOSET.

refined. It is well to have diversity of coloring both in the walls and equipment. If the walls are painted a reasonably dark color to a height of five or six feet, and the ceiling color brought down to meet this line, divided by a band or simple stencil design, the effect is very satisfactory. If the color design is carried around the door and window frames, making an artistic flat decoration, so much the better.

The introduction of tile and mosaic at the back of plumbing fixtures and radiators gives a touch of color and in addition an element of cleanliness. (See Fig. 74.)

The walls of the children's ward may be made most entertaining for the little folks by using simple decorations of "Mother Goose" or "farmyard" pictures, pasted on the walls in the form of a frieze and made permanent by a coat of varnish; or prints of larger pictures may be fastened to the wall in the same way; or, as mentioned in the chapter on children's hospitals, the walls may be decorated with Ceramic wall tile.

The day of white walls for *operating rooms* or any other rooms, let us hope, is past. The walls of the operating room, if of tile or marble, should not be white

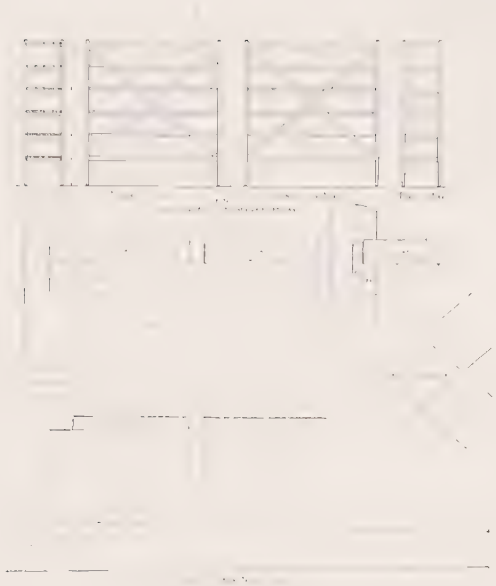


FIG. 415. LINEN CLOSET DETAILS.

but of some tone which will not absorb too much light but dark enough to prevent eye strain on the part of the surgeon and attendants. If the walls are painted, the same argument will hold good.

Many surgeons today wish the floors and lower portion of their operating room a very dark green, and use dark gowns for themselves and attendants, for the same reason—to prevent eye strain and to allow a better concentration on the subject to be operated upon.

With reference to *nurses calls*, too much cannot be said in favor of doing away with the noisy system of electric bells. There are many systems of the so-called "silent call" on the market. All of them have merit. There are, however, essential points which should be considered in selecting a system:

1. The system should be simple and as nearly "fool-proof" as possible.

2. The part made accessible to the patient should be of non-metallic substance, with smooth lines, non-detachable and easy to operate.

3. The attachment to the wall should be of such a nature that if the connecting cable should be held by the bed-post and the bed suddenly moved, the entire system will not be disarranged; in other words, the "plug" to which the cord is attached should be readily removable, whether a straight or a side pull is exerted. This is a most important feature.

4. The resetting station should be within easy reach of the patient's bed; if on the wall, at such a height and location that the nurse can reset it without taking the time to go around the bed; if at the press-button itself, which is in the patient's hand, so much the better; but if the point of resetting is at the patient's hand, there should be some locking device so that the patient cannot easily cancel her own call.

5. The signal lights, if in a ward, should be shown over each bed, also at the entrance of the ward, at the nurses' station and at the grand annunciator in the superintendent of nurses' office. Together with the last mentioned, an elapsed time record can

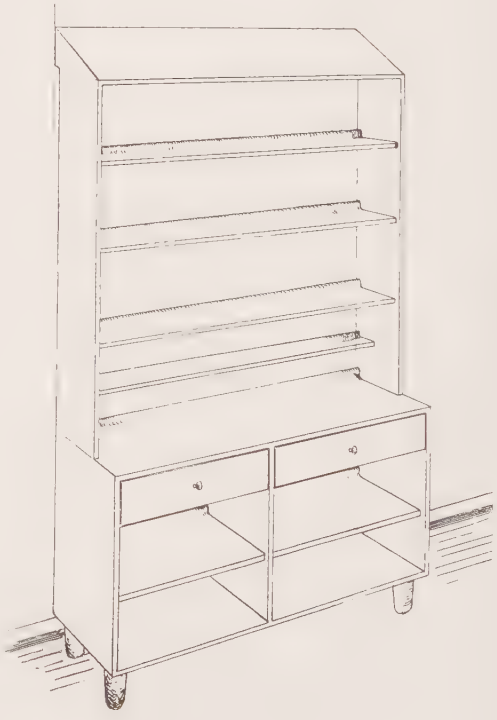
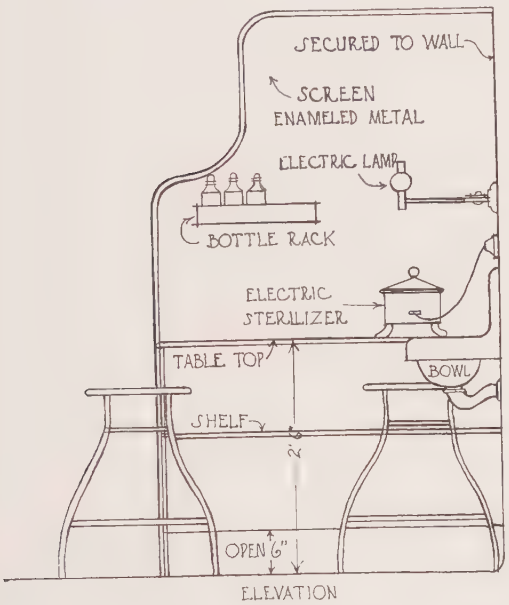


FIG. 416. KITCHEN CABINET.

be kept, showing the time between any call and its cancellation. This is a device which always settles a dispute as to whether a call remained unanswered one minute (as the record might show) or ten (as the patient might claim).



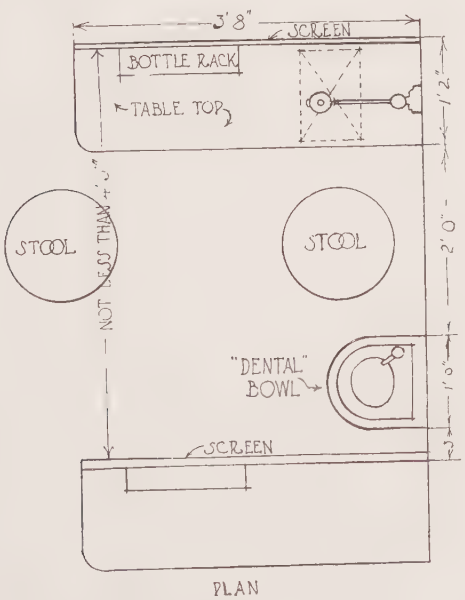


FIG. 417. NOSE AND THROAT DEPARTMENT TREATMENT BOOTH.

FIG. 418. DETAIL OF HOOK HANDLE FOR DOORS.

A similar system may be installed for calling internes. The call is sent in from the main office and is flashed to different locations in the hospital. The interne, seeing his color or number illumined, calls the office from the nearest 'phone and gets his instructions. Signal lights for special calls, indicating special service, can also be arranged.

The loud-speaking telephone, with a

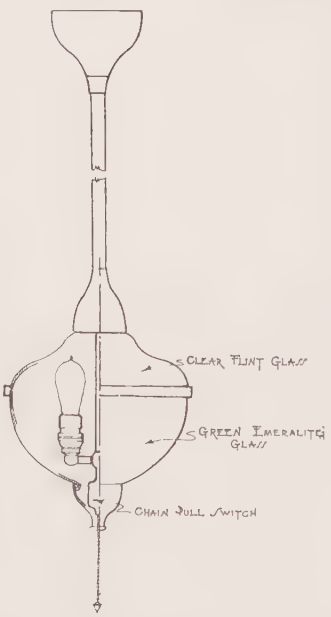


FIG. 419. DETAIL OF WARD LIGHTING FIXTURE.

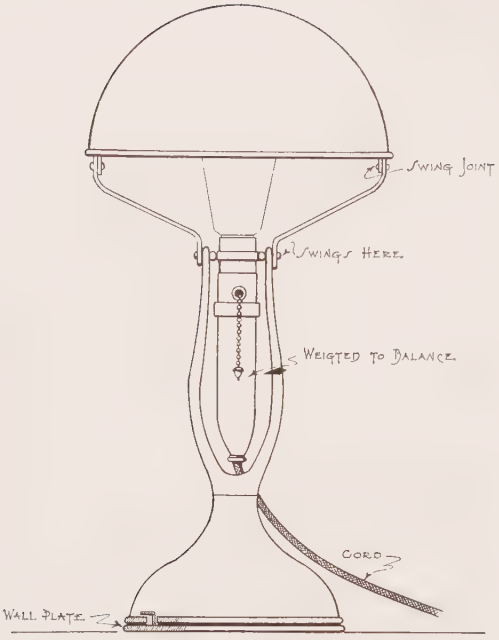


FIG. 420. PORTABLE BEDSIDE LAMP.

sounder at convenient locations throughout the institutions, is now used to good advantage for calling superintendent or doctors.

A telegraph key, with sounders at convenient points through the hospital, has been found a most effective calling device. It offers little or no disturbance to the patients.

Vacuum cleaners, it is the prevailing opinion, should be provided for every hospital of fifty beds or over, where power is available. The piping through the buildings can be very easily installed. There should be a sufficient number of outlets to make the work easy of accomplishment by the attendants, no point in any room being more than fifty feet from an outlet. Each outlet should be valved, so that the applying of the hose can be done with as little noise as possible. To that end, a special construction is desirable, making it possible to enter the hose before opening the valve, thus eliminating much of the noise.

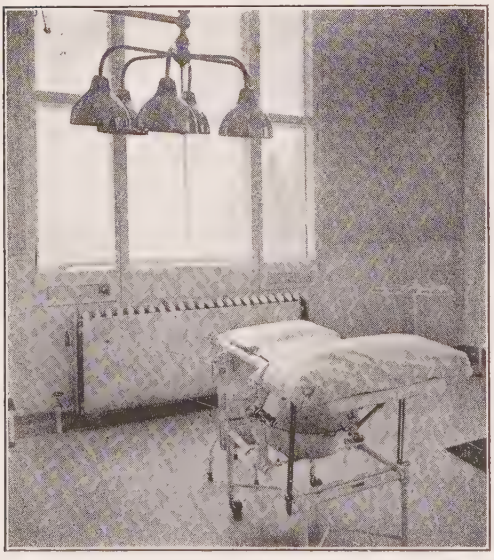


FIG. 421. OPERATING ROOM, QUINCY CITY HOSPITAL, SHOWING RADIATOR SHIELD AND CRANE LIGHT.

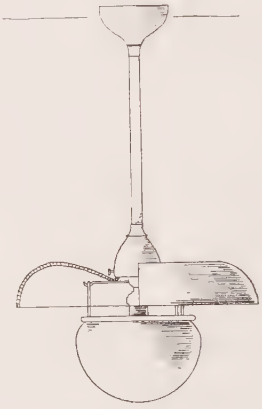


FIG. 422. OPERATING LIGHT.

There is some question about *nurses' stations.* Just where that of the head nurse of the floor or section should be is a question about which there is much discussion among hospital administrators—whether in a room adjoining the ward, in the open corridor, at a semi-glazed observation station, or in the ward proper. Dr. Rowe, the late dean of hospital superintendents, used to say that he believed the nurse on duty should be in sight of her patients as well as within hearing. In large wards the center-of-the-ward station may work out with the best results.

Wherever this station may be, certain

conditions and equipment should exist. The nurse should have a table or desk, with sufficient light for her work of charting and keeping her records. She should have facilities for writing her records and holding them after they are written. At this point, the nurses' call system should have its annunciator.

The writer believes that the charts, notes and standing orders for each patient should be kept together and that, as far as possible, those sheets should be of uniform size.

The writer has found the most suitable chart-holder to be made of heavy manilla paper, with the tops folded so as to enclose the top ends of all the papers, all held in place by regular ring paper clips (Fig. 423). If the charts are to be hung, each chart is punched in the right spot for hanging; if placed on shelves, the punching is not necessary. These chart-holders are light, serviceable, and noiseless. A nurse, in going through the wards with the doctor, can take in her hands the charts for the whole ward, having them ready as the patient is approached. In this way they are always kept away from the patient, whereas if the chart is left on the bed it is available to the inquiring mind of the visitor and of the patient himself.

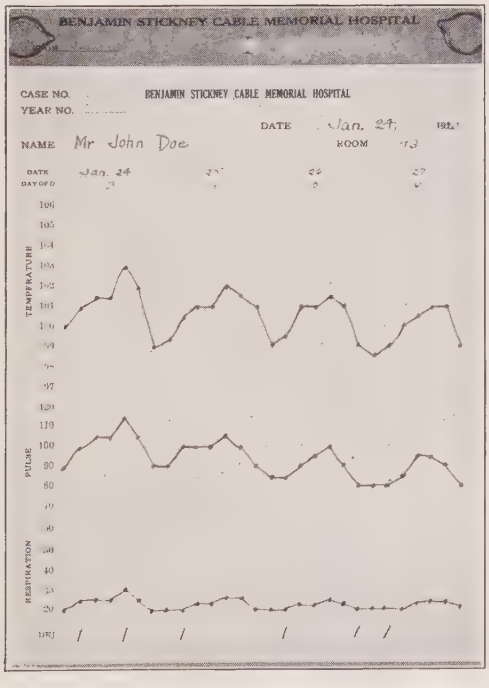


FIG. 423. PAPER CHART HOLDER AND CHART.

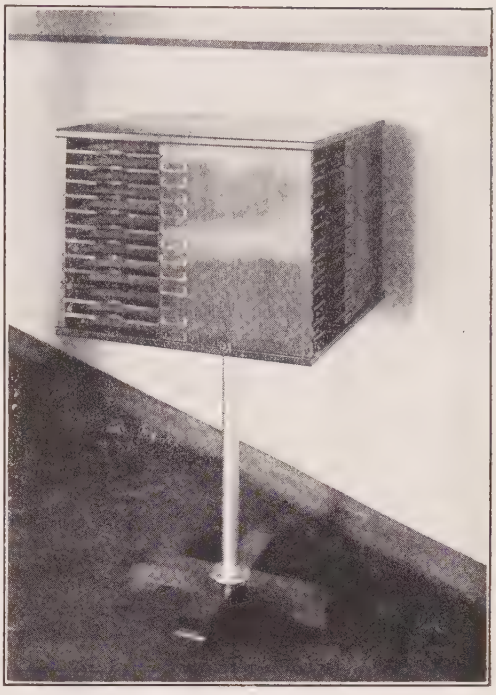


FIG. 452. REVOLVING CHART CASE.

Various methods for holding the charts in readiness for inspection are employed —one, the chart-case opening like a book with one cover against the wall, which, when open, discloses all the charts to view at one time (Fig. 424); another, the desk with "pigeonholes" for each chart-holder; a third, adopted by the

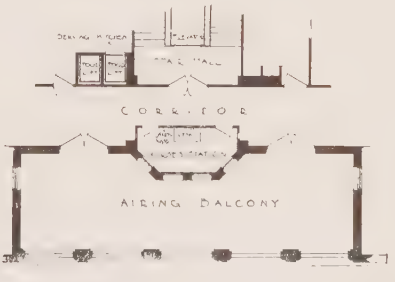


FIG. 426. PLAN OF NURSES' STATION.

writer for use where there are a large number on one service, built on the principle of revolving book-case, with the center of the case placed on a level with the nurse's desk, so that without rising the nurse can reach any chart (Fig. 425).

Where a room for the nurses can be provided, this should be central. The station shown (Fig. 426) illustrates an ideal nurse's station, for from this station the nurse controls not only the corridor, but the stair hall, the elevator, the patients' airing balcony and the serving kitchen entrance; with the use of the telephone, she is in touch with all departments.

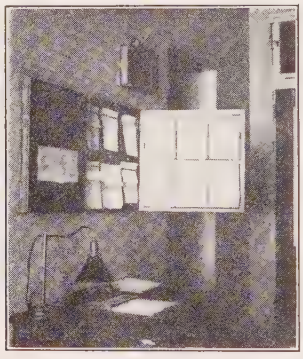


FIG. 424. WALL CHART CASE.

Equipment

CHAPTER XVIII.

The question of hospital equipment is fraught with nearly as many perplexities as the planning of the buildings. The question of the best bed, the best food wagon, the best operating table, or the best wheel stretcher is constantly met. There seems to be no general rule which will apply except this, that the simpler the lines of the apparatus or article which will accomplish the purpose with the greater conservation of energy of those using it, the better the equipment.

The ordinary dealer in hospital equipment tries to sell the wares which he has in stock, and is not anxious to have special designs ordered; but many times, in order to get the best results, it is necessary to have equipment specially made. It is true that the greater part of the equipment can be standardized, but it is equally true that much improvement remains to be made in some of the present standards.

Discussion of equipment may properly consider first the furniture of the patient's own room, beginning with the *bed*. This must first of all be comfortable for the patient; it must be of the right height to make work easy for the nurse; it should have extension legs to allow of being raised at either end without blocks; it must be easy to move, yet stationary when required; it should have an adjustable back rest, a bar at the foot to take care of the extension in leg fractures, a detachable irrigator staff, and crosswise bars at the head whereby the patient may lift himself or get mild exercise. Full Gatch or Fowler position frames, built into the bed, can be used to great advantage (Fig. 427). Care should be taken that the construction of the frame is such that no projecting braces nor ties will interfere with the comfort of the patient.

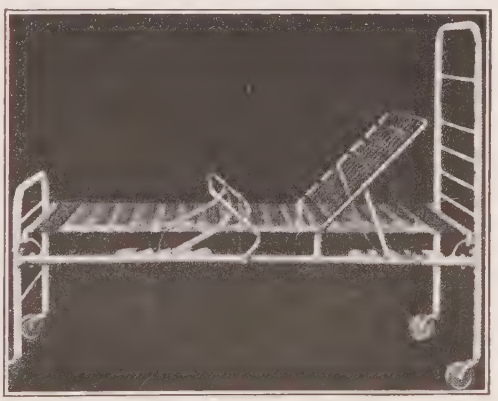


FIG. 427. BODY REST FOR FOWLER POSITION.

To facilitate moving the bed, various forms of bed trucks are in use; that designed by Dr. Mackintosh of the Western Infirmary, Glasgow (Fig 427A), provides for a fixed foot, with large casters on the head end; when the patient is to be moved, the nurse or orderly throws a lever at the foot of the bed, forcing down a fifth leg with large caster, thus raising the foot of the bed from the floor. This leaves the bed on three large casters, ready to be moved with the slightest effort. A similar bed is now manufactured by American makers (Fig. 428). The single staff bed truck, used in a similar way, is quite effective (Fig. 429).

A fracture bed having a certain amount of resilience is now made with steel slats or carriage springs. The most popular is the open pattern, which is easily cleaned and adjusted.

The two-piece maternity bed, which allows for the removal of the foot half and adjustment of the stirrups, is generally coming into service in maternity hospitals. The illustration (Fig. 430) is that of a bed found by the writer in Berlin in 1913. American manufacturers, however, have improved on this in many details (Fig. 431).

The *bedside table* is perhaps the next in importance in the patient's outfit; for, in the ward, it contains prized possessions, and is subject to many uses. Its contents should not be subjected to

the gaze of the occupant of the next bed; at the same time it should be open enough for good ventilation. It should be adjustable so as to serve for an "invalid" or over-the-bed table (Fig. 432); another type shown (Fig. 434) fastens directly to the bed and requires no floor space. For private rooms not connected with private baths, the utilities such as bed-pan, bowl, pitcher, etc., may be arranged on the doors of a bedside cabinet and so kept out of sight.

In the private rooms the furniture should be refined and simple in lines, open underneath to facilitate cleaning. Plate glass tops placed over scarves of the same material as furniture covering or curtains help to bring the room into harmony. Chairs, of course, should be comfortable; if upholstered, they should have removable covers.

Footstools are always desirable. Those made similar to the Pullman car porters' stools have the advantage of stability (Fig. 435).

For mattresses, nothing has been found more comfortable than a good quality hair. Both hair and feather pillows should be provided; and the small "comfort" pillow or bolster, about five inches in diameter and eighteen inches long, often eases the aching back or relieves the pain of a fractured limb and is also of great service in the maternity department.

There might be added to the private room a good picture or two. Hung with a short cord directly from the back, they are easily taken down for cleaning.

A rug, preferably washable, may be added with good effect.

The hangings for the windows also should be washable.

Care of patients' clothing might well be discussed here. In some hospitals the clothing of the ward patients is carefully put into individual lockers and the keys turned over to the patient, although he himself never sees the lockers; in others, "pigeonholes" or small bins are provided for each; and in still others, the clothing of one patient is hung side by side with that of others in a clothing room.

The method adapted by the writer from the system used in the Munich-Schwabing Hospital (Fig. 436) is that of cloth lockers or bags of sufficient size to hold the clothing without folding. The bag is oblong, about eight by sixteen by fifty inches high, and is held in place by wire grilles at top and bottom; from the top grille a hook extends through the top of the bag and serves to hang the bag to the pipe rack erected for the purpose; from the top grille is suspended a garment hanger, with additional hooks for small garments. The bottom grille serves to hold shoes and small articles. The clothing can be placed in this bag by

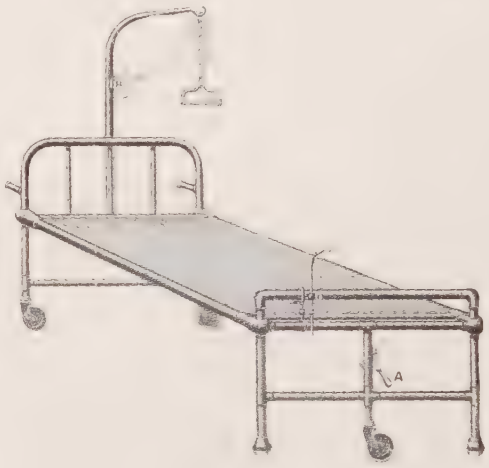


FIG. 427A. MACKINTOSH BED ADJUSTER.

the patient, in the admitting room, and taken to the clothing room on a truck provided for the purpose (Fig. 437).

Great care should be taken in equipping the *operating department.*

Sterilizers for hospital uses have, to a certain extent, become standardized and are manufactured by numerous specialists in that line. The selection of the best is oftentimes a matter of personal judgment, but as with other hospital utilities there are certain underlying principles involved, whoever makes the apparatus.

In the dressing sterilizer one should be able to sterilize all dressings, sponges, and other goods needed in the operations, and have the same dry, ready for use. To do this, a steam pressure of about fifteen pounds, for a sufficient length of time, or super-heated air, or

both, is necessary. The size of the apparatus depends on the needs of the institution. In America the most common forms are the horizontal, cylindrical and the globular; while in European hospitals the vertical cylindrical type or the cabinet form is used. A shape which admits of baskets or semi-closed boxes facilitates handling the dressings. The box sterilizer shown in Figs. 438 and 439, recently erected in the Royal Victoria Hospital, has some advantages over those of the same type found in Europe —principally in that the air is superheated and steam, at a less pressure than formerly, is introduced. The bacteriological tests, however, show absolute sterility.

The sterilizers for basins should be of sufficient size to hold what will be needed in an operation and should have an automatic lift both for cover and tray, either foot power or hydraulic.

For instruments, gloves, etc., smaller sterilizers may be used, but the same principles should prevail as in the larger.

A tank for saline solution, with thermostatic control, is a desirable addition.

The sterile water to be used in dressing, in irrigation, or for cleaning the hands during operation, must be most carefully prepared.

Bacteriologists assert that all of the harmful life is not destroyed at one boiling; but that to obtain absolute sterility, the process must be continued for three consecutive days, and even then, with careful filtration, minerals and solids are not removed. If they are right, safety to the patient will not permit the use of anything but distilled water for operation purposes. The water stills have become

FIG. 428. FIXED BED TRUCK.

standardized to such an extent that stills of almost any size can be procured in the market.

If sterile water is needed in a number of different parts of the institution, it is more advantageous to place the water still and receiver in an elevated position, conducting the distilled water by gravity through tin-lined pipe to the various points needed, where a local instantaneous heater can be located, with steam or electric heating unit. Water from the same still, through a separate storage tank, can be used for drinking purposes for the institution, as in the Royal Vic-

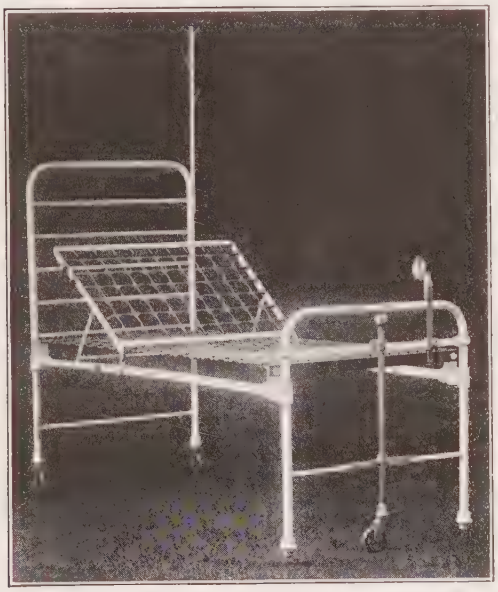


FIG. 429. PORTABLE ONE-PIECE BED TRUCK AND IRRIGATOR STAFF.

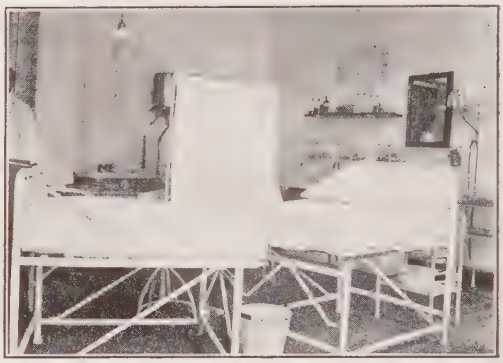


FIG. 430. TWO-PART MATERNITY BED, EUROPEAN MAKE.

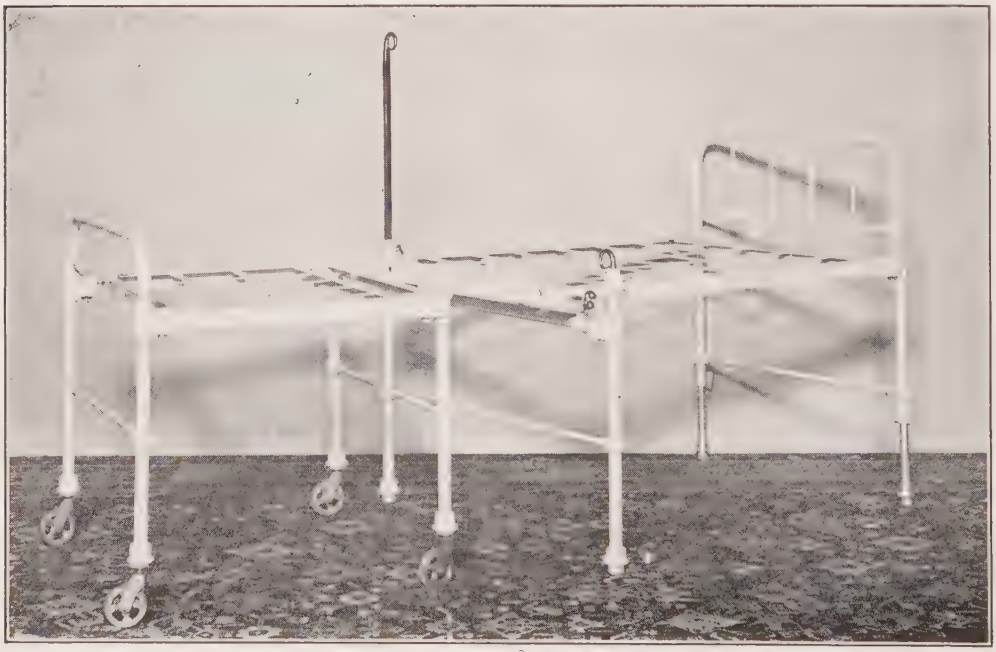


FIG. 431. TWO-PART MATERNITY BED, AMERICAN MANUFACTURE.

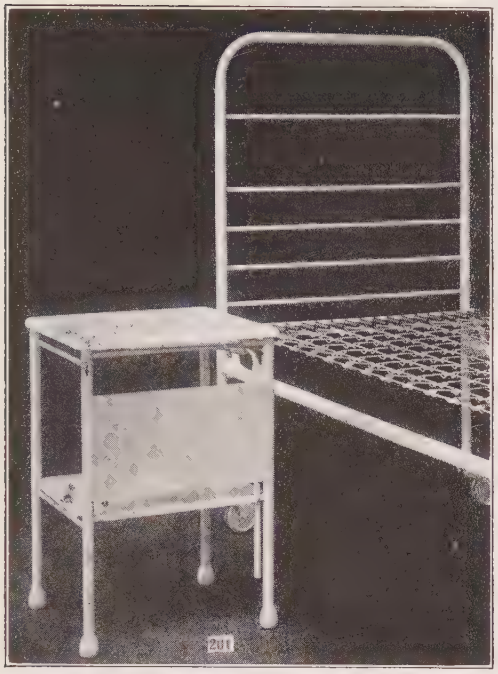


FIG. 432. ADJUSTABLE BEDSIDE TABLE.

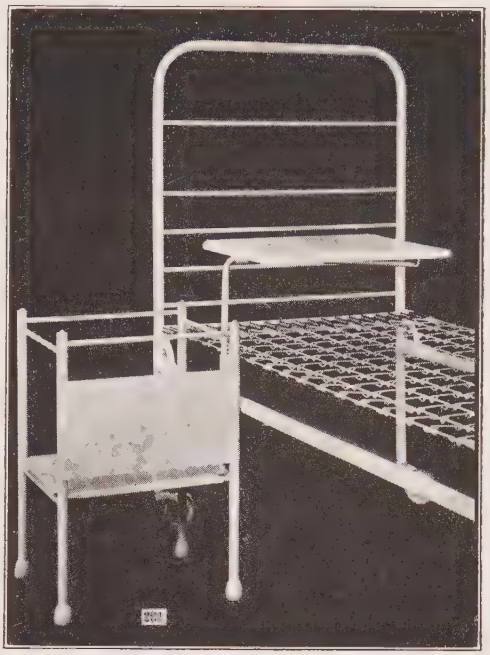


FIG. 433. ADJUSTABLE BEDSIDE TABLE, WITH TOP EXTENDED OVER BED.

toria and the Ohio Valley General Hospitals.

It often happens in small hospitals that no high pressure steam or gas is available for heating sterilizers. Electricity or even kerosene oil can be used.

The equipment for the operating rooms should be governed by the needs of the surgeons. A table with the numerous necessary adjustments, instrument and utensil tables, stools for both surgeon and anaesthetizer, and receptacles for soiled dressings are among the necessary items. If the room is fitted for compressed air, nitrous oxide gas, oxygen, and steam, the work of the surgeon is facilitated.

Cabinets for dressings, instruments, and blanket warming, either built-in (as in Fig. 133) or portable, are necessary in the operating equipment.

The newer type of alcohol dispensers, where only so much liquid as is needed

FIG. 434. PORTABLE BEDSIDE TABLE, ATTACHED TO SIDE OF BED.

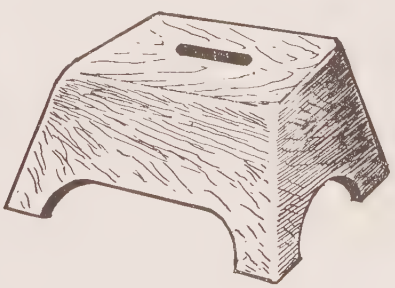


FIG. 435. PATIENT'S FOOTSTOOL.

FIG. 436. CLOTH LOCKERS FOR PATIENTS' CLOTHING.

is released by foot pedal action, is considered an economy, and in using this no two persons immerse their hands in the same fluid (Fig. 134).

Demand for a room where the dirty work of the ward unit can be done has developed what is commonly termed a *sink-room* or work room. In the older hospitals one will find no such room, and the work now being done in this room was usually done in the toilet room, with the bed-pans and urinals placed on the walls or wherever there were a few square inches of space. The need of such a room is great. Here not only are the bed-pans discharged, washed and sterilized, but there should be a place for the preservation of specimens in a cool, ventilated space, opportunity for the boiling of catheters, making of poultices, etc.

There should be a local *incinerator* in this room for the destruction of all ward waste, faded flowers, etc. (Fig. 441).

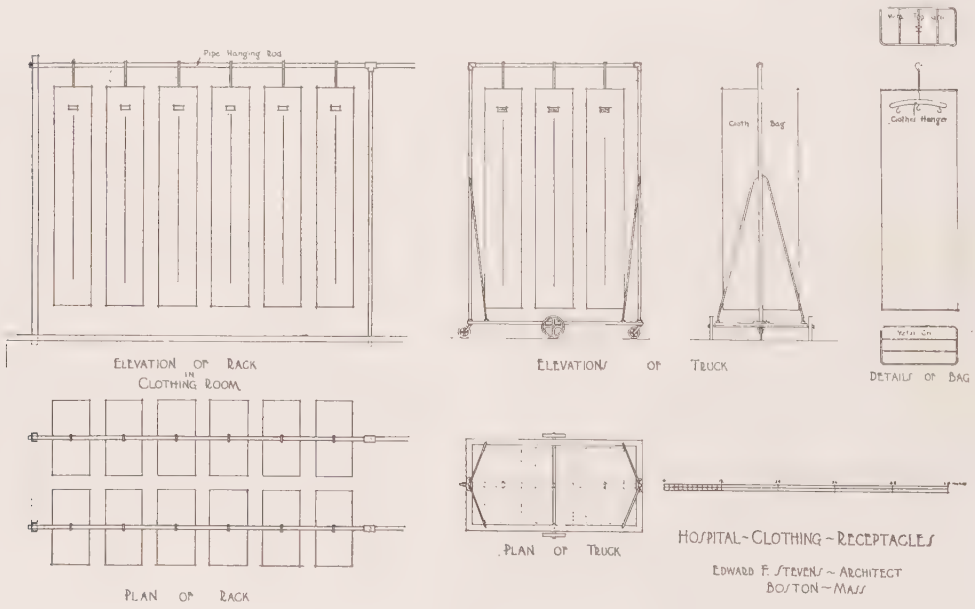


FIG. 437.

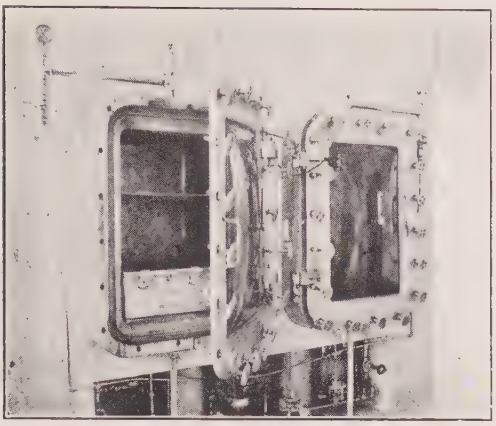


FIG. 438. BOX STERILIZERS, BUILT INTO WALL. OPEN.

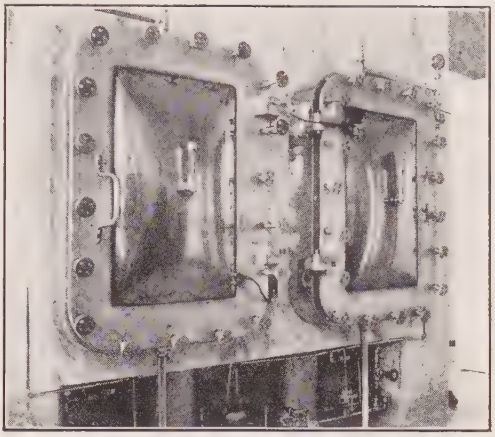


FIG. 439. BOX STERILIZERS, BUILT INTO WALL. CLOSED.

There should be a sink for the washing of rubber sheets and utensils, and an ice-box for crushed ice; in short, this should be a room which can be the general workroom of the section.

If there is no local laboratory, this room will often serve the purpose.

The *disinfecting room* in the general hospital should have either a steam pressure disinfector or a hot-air and formaldehyde disinfector, or both, and room for the storage of mattresses after disinfection.

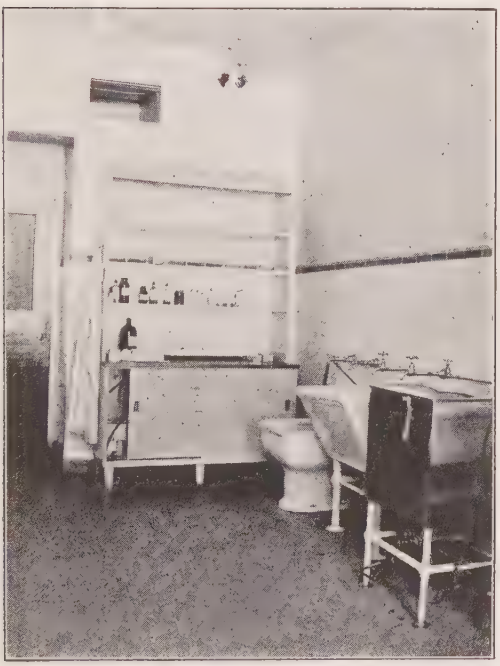


FIG. 440. SECTION OF SINK ROOM.

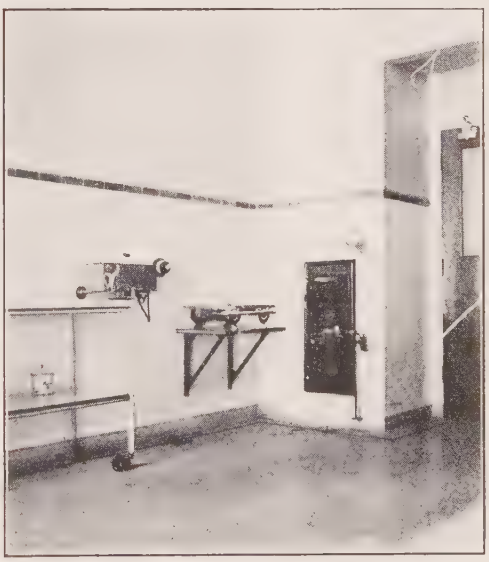


FIG. 441. SECTION OF SINK ROOM, SHOWING STERILIZER AND INCINERATOR.

CHAPTER XIX.

Landscape Architecture as Applied to Hospitals

There are greater possibilities for the care of the convalescent in suitably planned grounds around a hospital than within the walls; and when locating the buildings for a suburban hospital especial accessibility to the grounds should always be considered.

Wherever one goes in any of the larger institutions of Europe, one will see the convalescent patients walking or being wheeled along the shady paths, sitting under special arbors or awnings, enjoying the green grass and the flowers, and chatting with one another. Comfortable benches and easy seats, splashing fountains and simple forms of amusement, all add to the pleasure, and shorten the convalescence. Walks, with frequent benches for resting, should be provided. At the Virchow Hospital (Fig. 5), several acres are devoted to the park in addition to the well laid out and well equipped grounds of the hospital. In this park the staff, the nurses, the male and female patients are allowed, but on different days; so that it becomes a private park for the enjoyment of all. (See Fig. 442.)

In selecting the site, not only the exposure and the protection from cold winds should be considered, but the views from the hospital, the possible vistas from the wards or balconies. If the outlook is depressing in one direction it should be screened by a slight change in the location or by planting out the view.

The site selected may have most beautiful trees which the hospital authorities demur about having cut; but if the buildings cannot be placed to advantage without this cutting, then the test applied by some landscape architects—"If the tree were out of the way, would you wish one in that place?"—is a very good one to apply.

Runways of easy grade from the floor level to the ground are always desirable.

The planting should be carefully planned under the direction of some landscape architect of ability, so that the trees, the shrubs, the grass and the flowers bear the right relation to one another and to the architecture of the building. Shade should be provided where shade is needed, and care exercised not to plant too near the building so as to cause too much shade; shady walks are desirable, but shaded buildings never, for with the shade comes dampness and chill, therefore sunlight should reach the buildings wherever possible.

The tendency of many landscape architects to mass shrubbery against a building, leaving the buildings as a background, while it may enhance the beauty of the architecture or sometimes hide it, is very apt to shade a portion of the building which needs the sunlight. It is as true in landscape planning as in building planning that the patient must be considered, and the therapeutic and healing benefits of the sun's direct rays must outweigh the architecture; for, as was said in another chapter, the hospital is built for the patient and not for the glorification of the architect or his running mate, the landscape architect.

In the laying out of the patients' lawn or patients' court, the planting should be so arranged as to act as a screen from the public, as shelters to benches, and as shields against the prevailing cold winds.

Fountains and pools, a rustic bridge and acquatic plants, if space and facility admit, and plenty of green grass add materially to the interest. If there are grades, these grades should be gentle, for the convalescent must be encouraged. All these things help the patients who are just recovering from an operation or convalescing from a fever to enjoy God's great out-of-doors.

Just a few examples by way of show-

FIG. 442 VIRCHOW HOSPITAL, BERLIN, GERMANY. VIEW IN GROUNDS

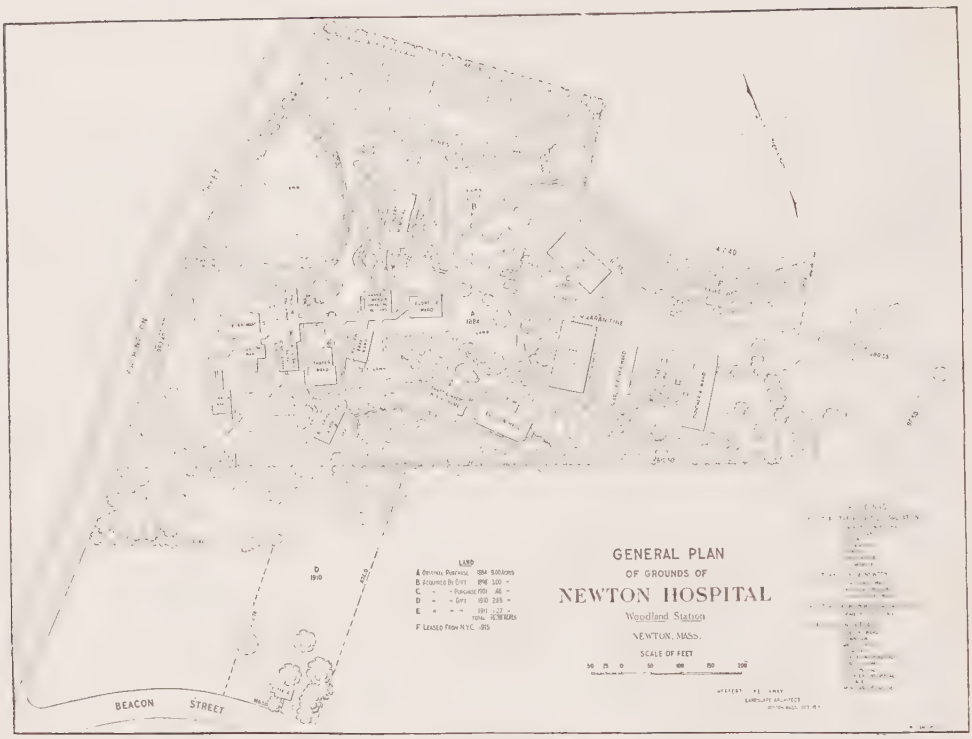


FIG. 443.

FIG. 444. NEWTON HOSPITAL, NEWTON, MASS. ENTRANCE TO GROUNDS.

FIG. 445. NEWTON HOSPITAL, NEWTON, MASS. FOUNDERS' MEMORIAL.
Kendall, Taylor & Stevens, Architects.

FIG. 446. NEWTON HOSPITAL, NEWTON, MASS. GROUP VIEW.
Kendall, Taylor & Stevens, Architects.

FIG. 447. NEWTON HOSPITAL, NEWTON, MASS. PATHWAY TO NURSES' RESIDENCE.
Herbert J. Kellaway, Landscape Architect.

FIG. 448. NEWTON HOSPITAL, NEWTON, MASS. VIEW IN GROUNDS.
Herbert J. Kellaway, Landscape Architect.

FIG. 449. NEWTON HOSPITAL, NEWTON, MASS. WAITING LODGE.

FIG. 450. NEWTON HOSPITAL, NEWTON, MASS. GROUP VIEW.
Kendall, Taylor & Stevens, Architects.

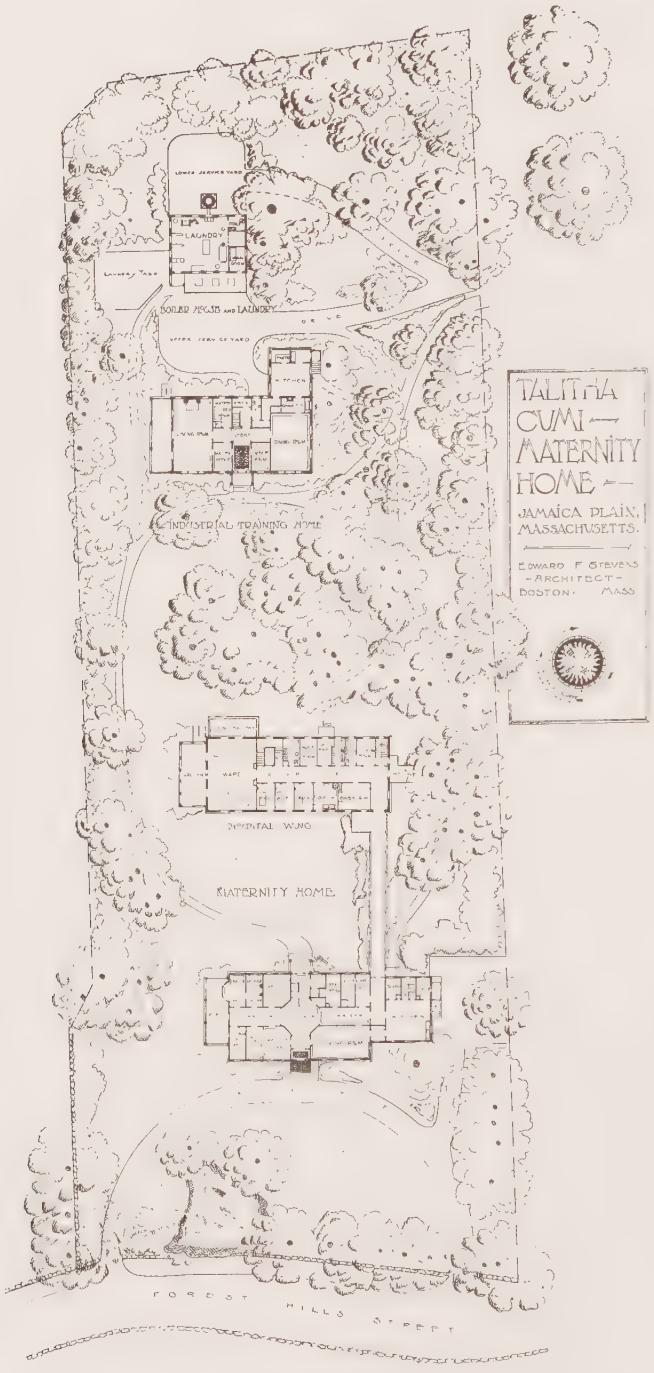

LAUNDRY
BOILER HOUSE and LAUNDRY
INDIVIDUAL TRAINING HOME
MATERNITY HOME
FOREST HILLS STREET
TALITHA CUMI — MATERNITY HOME —
JAMAICA PLAIN, MASSACHUSETTS.
EDWARD F. STEVENS
- ARCHITECT -
BOSTON. MASS

FIG. 451.

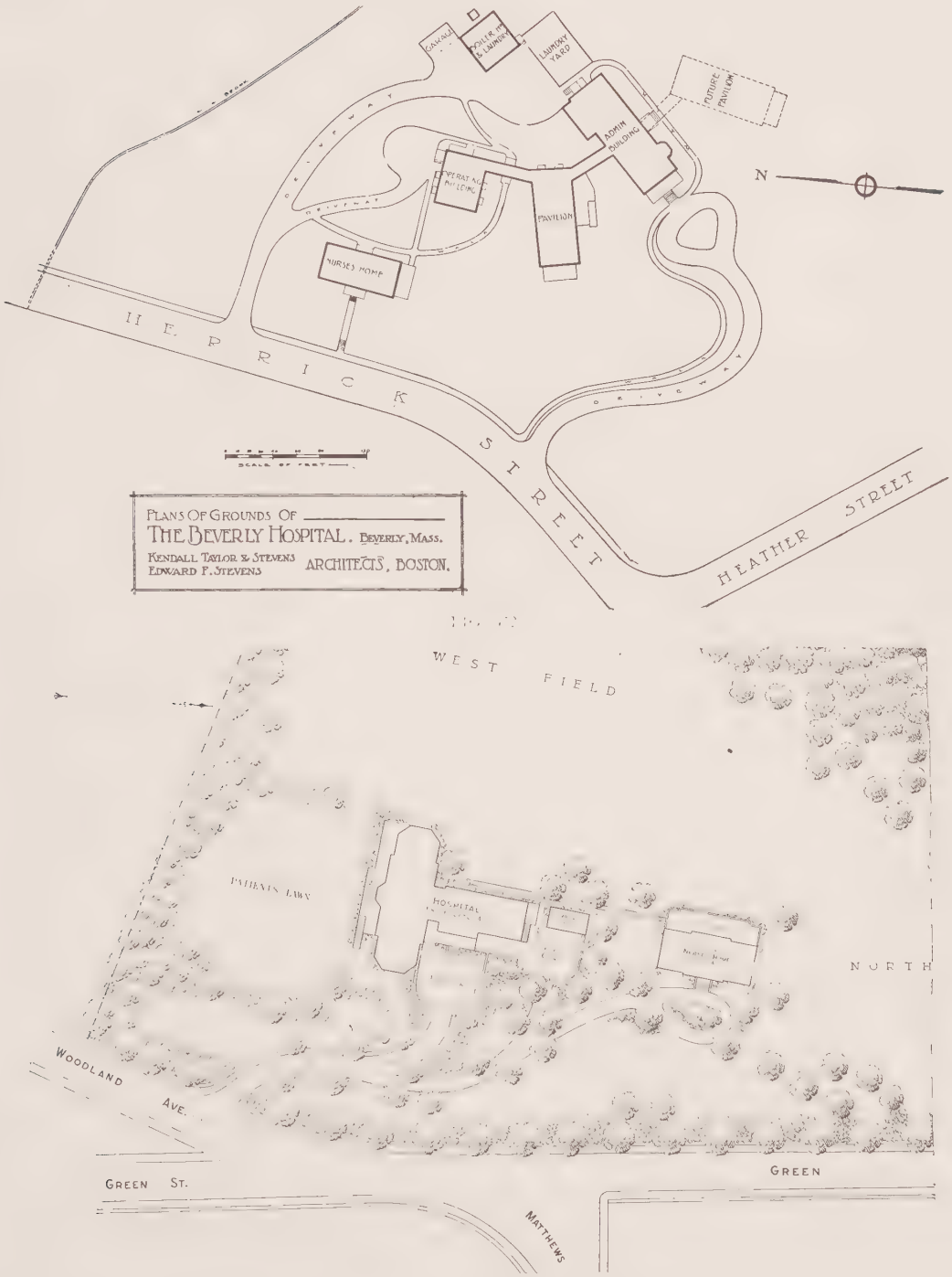


FIG. 453. HEYWOOD MEMORIAL HOSPITAL, GARDNER, MASS.
Kendall, Taylor & Stevens, Architects.
Herbert J. Kellaway, Landscape Architect.

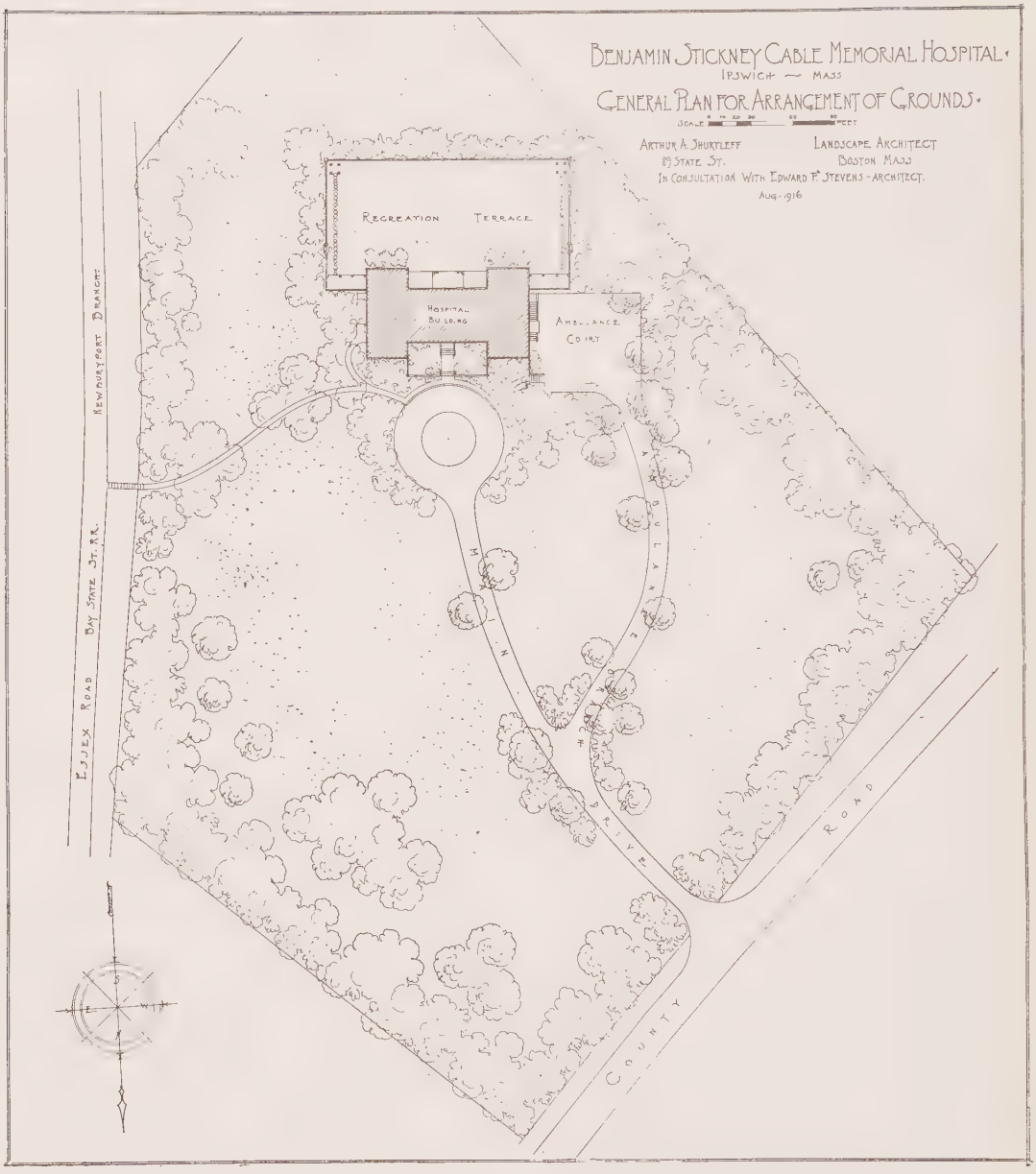

BENJAMIN STICKNEY CABLE MEMORIAL HOSPITAL
IPSWICH — MASS
GENERAL PLAN FOR ARRANGEMENT OF GROUNDS
SCALE 0 10 20 40 80 FEET
ARTHUR A. SHURTLEFF
83 STATE ST.
LANDSCAPE ARCHITECT
BOSTON MASS
IN CONSULTATION WITH EDWARD P. STEVENS - ARCHITECT.
AUG. 1916
RECREATION TERRACE
HOSPITAL BUILDING
AMBULANCE COURT
NEWBURYPORT BRANCH
ESSEX ROAD
BAY STATE JT. R.R.
MAIN DRIVE
BOULEVARD
COUNTY ROAD

FIG. 454.

FIG. 455. AN OLD PEOPLE'S HOME. VIEW IN GROUNDS.

ing how some institutions have cared for the artistic effect as well as for the comfort of the patient:

In the general plan for the *Newton Hospital* (Figs. 443-450) will be seen a development extending over a score of years. When expansion was necessary more land was acquired, buildings altered and moved, and the scope of the plant increased. The whole group was brought into greater harmony by a careful study of the landscape possibilities, which were carried out under the able direction of Mr. Herbert J. Kellaway. Roads were changed, walks created. objectionable views planted out, tennis courts built, and the whole brought into harmony.

In the Talitha Cumi Maternity Home (Fig. 451) the careful study of the possibilities of the best location with the landscape architect before planning the buildings led the architect to take advantage of the natural beauty of the rather restricted site.

At the Beverly Hospital (Fig. 452) at Beverly, Mass., and the Henry Heywood Memorial Hospital (Fig. 453) at Gardner, Mass., the problems were similar. Steep grades were encountered and easy approaches considered, all to give not only a comfortable and dignified approach, but one which would show the buildings to the best advantage and at the same time screen the patients from the view of approaching carriages. Study was made of the approach of service drives to kitchen and morgue.

The site selected for the little hospital at Ipswich, the Benjamin Stickney Cable Memorial Hospital (Fig. 454), was in the beginning a barren field; and the problem given to the landscape architect was to re-create the site by planting trees and shrubs, to make an easy approach to both front and ambulance entrances, to make an approach from the street car line to the building, and at the same time to screen all of these approaches. The high wall of the patients' court and the location of the airing balconies made this possible. This patients' court has private walks and pavilions and seats for the convalescents.

With the city hospital on restricted land, small opportunity may exist, but what little there is to be done should be considered wisely. One rarely sees a more charming approach to a city hospital than that to the Phipps Psychopathic Clinic at the Johns Hopkins Hospital.

If the architects can make the approach to their hospitals speak the welcome that they try to express in the entrance to the buildings, they will go a long way toward expelling the fear of entering an institution.

FIG. 456. PORTABLE SEAT, WITH AWNING.

CHAPTER XX.

Remodeling a House for a Hospital

The larger and more symmetrical the house, the better the hospital it will make. Not every house will develop into a good hospital, however, for there are many essentials required by the hospital which are not required in the house. The house, if it is to be used as a general surgical and medical hospital, must have a room which can be adapted into a well-lighted operating room with its adjacent utilities; also rooms of sufficient size to accommodate a reasonable number of beds; and rooms for the cooking and serving of meals. When a house of this character can be found, then it is practicable to utilize it for a hospital, with proper care of details.

The selection of the house to be used must have the same care as the selection of a site for a new hospital; that is, there must be sufficient light and air about the building to insure good ventilation; there must be freedom from disturbance from adjoining property, and, if possible, a pleasing view from the building. Care should be taken to select a house where the sunshine penetrates the principal rooms.

The transformation of a house into a hospital, illustrating this paper, was made at two different periods—in 1909 when the old Choate homestead at Woburn was given to the Woburn Charitable Society, and again in 1916 when that institution, growing from the small beginning, was developed into a hospital of moderate proportions and capable of still further increase.

In the first development it will be seen how, with very modest changes, a fairly workable hospital was evolved. The exterior was of the type one often encounters in New England especially, built in the sixties, with great double parlors, heavy cornices and finish, stately dining room and serving pantry, and basement kitchen. All of this, however, lent itself to "hospital treatment," as will be seen by comparing the plans of the original house with those of the replanned hospital. The funds available for alterations were small and the changes necessarily restricted.

The grand parlor made an excellent five-bed ward without change, while the sitting room served as a children's ward,

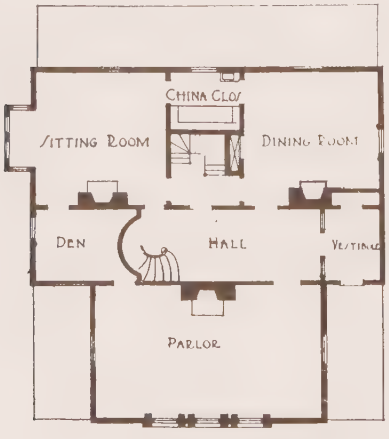


FIG. 457. FIRST FLOOR BEFORE MODIFICATION.

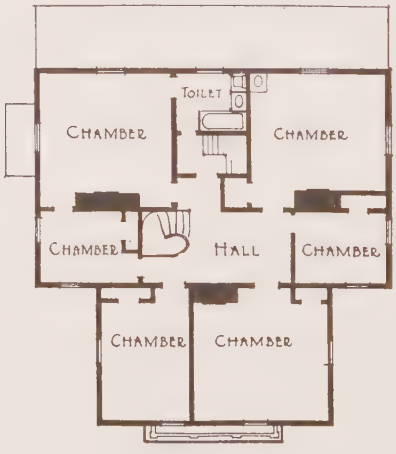


FIG. 458. SECOND FLOOR OF THE CHOATE HOMESTEAD.

FIG. 459. THE CHARLES CHOATE MEMORIAL HOSPITAL AS PRODUCED BY THE FIRST MODIFICATION OF THE CHOATE HOMESTEAD.
Edward F. Stevens, Architect.

and the little den as the hospital office. The circular stairs had to go, and were replaced by more commodious stairs, up which the stretcher could be carried. The dining room was cut into a corridor, a serving kitchen, and a linen closet. The garden porch served as an airing balcony.

The second story also developed simply and inexpensively. A good operating room and accessories were made from one of the large chambers, while another served as a second-story serving room. The balcony was extended to this story.

The changes in the basement were small. The kitchen needed no change; the old laundry served nicely for a nurses' dining room; in the attic, the servants' rooms were used for nurses. Thus the Charles Choate Memorial Hospital started out as a complete fourteen-bed institution.

During the eight years of successful management after the opening, friends of the hospital, seeing the splendid work being accomplished with the simple equipment, came to the rescue with bequests and generous donations, so that in 1916 the much-needed expansion was authorized.

To plan for the growing needs of the present and the future and to preserve and bring into harmony as much of the old building as possible with the new was the problem now to be worked out. The greatest needs were, first, better operating facilities; second, more private rooms; and third, a maternity department worthy of the name.

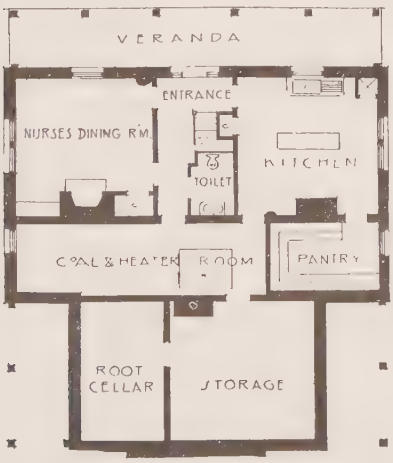


FIG. 460. BASEMENT FLOOR AS FIRST REMODELED.

The laundry has been made into a nurses' dining room. Otherwise there is little change.

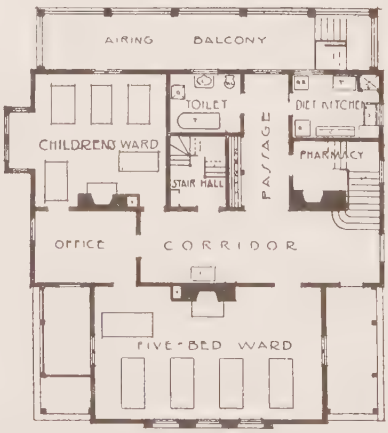


FIG. 461. FIRST FLOOR AFTER FIRST REMODELING.

The parlor and sitting room have been transferred into wards. The den has been made into an office. The circular stairway has been removed.
Edward F. Stevens, Architect.

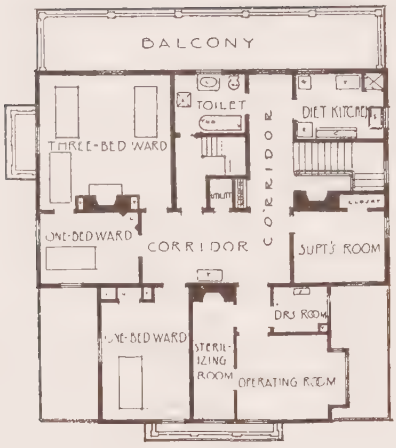


FIG. 462. SECOND FLOOR AFTER FIRST REMODELING.

One large bedroom has been transformed into an operating room, and another into a diet kitchen. The other bedrooms have become wards and superintendent's room, respectively.

Edward F. Stevens, Architect.

But few changes were necessary in the original building, as will be noted on plans (Figs. 459-463). The kitchen was enlarged; the old nurses' dining room was made into cold storage and a serving room for the new dining room; the stairs were removed and the serving kitchens enlarged; the old operating suite was turned into a maternity delivery room and bath room, and one of the private rooms taken as a creche.

The new portions are planned to meet the deficiency of the old building and the growing needs of the community. A new main entrance and office are created, and a new operating department is provided.

The operating department consists of two north-lighted operating rooms, a sterilizing room, an anesthetizing room, a nurses' work room, and a surgeons' locker and dressing room. All these rooms are grouped around an octagonal rotunda, in the center of which is a triple scrub-up fountain, designed not only as a necessary utility, but also as an architectural feature of the department. (Fig. 401.) The base of the fountain is of mosaic; the bowl is porcelain enameled, 40 inches in diameter; the water is controlled by the latest type of elbow valves; and the whole is surmounted by a utility shelf of opal glass. The large size of the rotunda leaves ample room on all sides for the wheel stretcher to pass. The floor of this department is of terrazzo and the walls are enameled hard plaster. Large north windows, extending above the ceiling, give the best of daylight, while four special artificial lights illuminate the operating rooms at night.

The ambulance entrance is below the surgical department and adjoins the laboratory, the X-ray, and the autopsy rooms. A small isolating suite, with special plumbing, is provided, as well as drug and storage rooms.

In the basement of the medical wing

FIG. 463. THE CHOATE HOSPITAL AS IT APPEARS AFTER ADDITIONS AND FINAL REMODELING.

Edward F. Stevens, Architect.

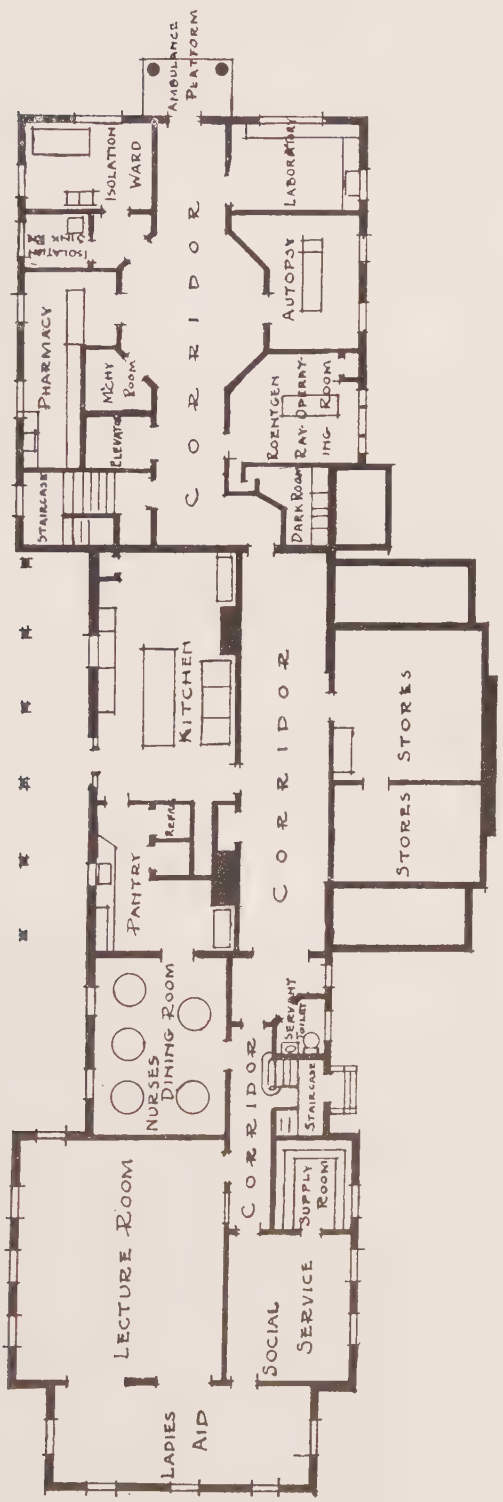


FIG. 464. GROUND FLOOR OF THE CHOATE MEMORIAL HOSPITAL IN ITS PRESENT FORM.
The added wing on the right is known as the Dr. John M. Harlow Surgery, and the one on the left as the William B. Beggs Memorial.
Edward F. Stevens, Architect.

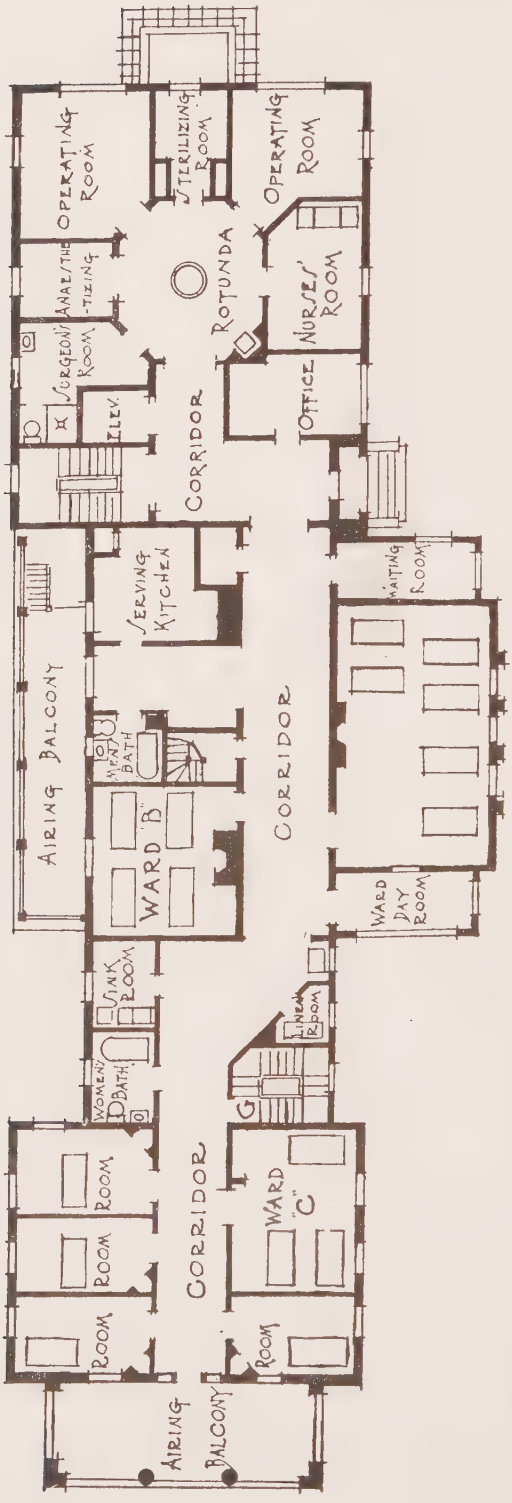


FIG. 465. FIRST FLOOR, CHOATE MEMORIAL HOSPITAL IN ITS PRESENT FORM.
The operating rooms and other rooms in the surgical suite center about a rotunda, in the center of which is a surgeons' scrub-up fountain.
Edward F. Stevens, Architect.

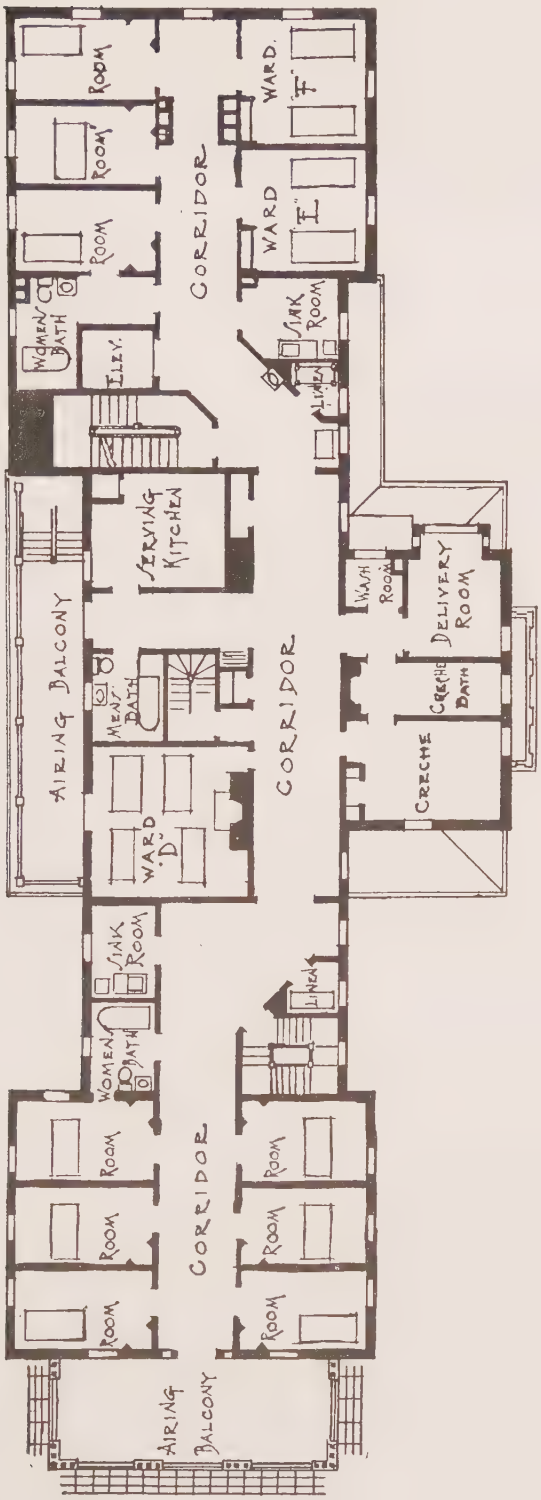


FIG. 466. SECOND FLOOR, CHOATE MEMORIAL HOSPITAL IN ITS PRESENT FORM.
The former operating room (in the center) has been taken as a delivery room.
Edward F. Stevens, Architect.

FIG. 467. ATTIC FLOOR, CHOATE MEMORIAL HOSPITAL IN ITS PRESENT FORM.
Devoted to housekeeper's, special nurses' and servants' rooms.
Edward F. Stevens, Architect.

are located the nurses' dining room, the lecture and ladies' aid rooms. An automatic electric elevator connects all stories. The first story of the medical and the second story of both the surgical and medical wings are planned for private patients, mostly single rooms being planned. At the south end of the building airing balconies are provided.

Sink rooms, toilets, baths, and linen rooms are arranged for the efficient carrying out of modern hospital service. The floors of all wards, rooms, and corridors are covered with linoleum; the doors are without panels; and all detail of finish is of plain, simple construction.

For the mechanical plant, the old stable was utilized, affording plenty of room for the heating and laundry equipment.

These remodeled buildings, with the nurses' residence (also a donation) on the same site, make a complete thirty-three-bed hospital.

APPENDIX.

War Hospitals

Development of the Hospital Ward Unit of the United States Army

When the United States entered the world ward in 1917, there existed few, if any, large army hospital units in this country, and the few which existed had not received the careful study and planning accorded the civilian hospitals and were hardly comparable with the army hospitals of other nations.

When the government established the sixteen cantonments and the sixteen National Guard camps, hospitals for the accommodation of approximately one thousand beds each were designed by the army officers in charge of this work at the Surgeon-General's office. These groups originally comprised from sixty to seventy buildings, but this number was greatly augmented later by the addition of convalescent units.

In this discussion, the general grouping and the portion occupied by the sick soldiers—the ward unit—will be considered; the mechanical plant, the operating unit, and the housing for staff and orderlies will not be taken up.

It should be remembered that at the time the United States entered the war the French had more than six hundred thousand and the British nearly one million beds in army hospitals, from which it was possible to find precedents as to the plan best adapted to the needs of the United States. In the French army hospitals, in particular, there had been developed an economical and practical solution of the ward unit, at least.

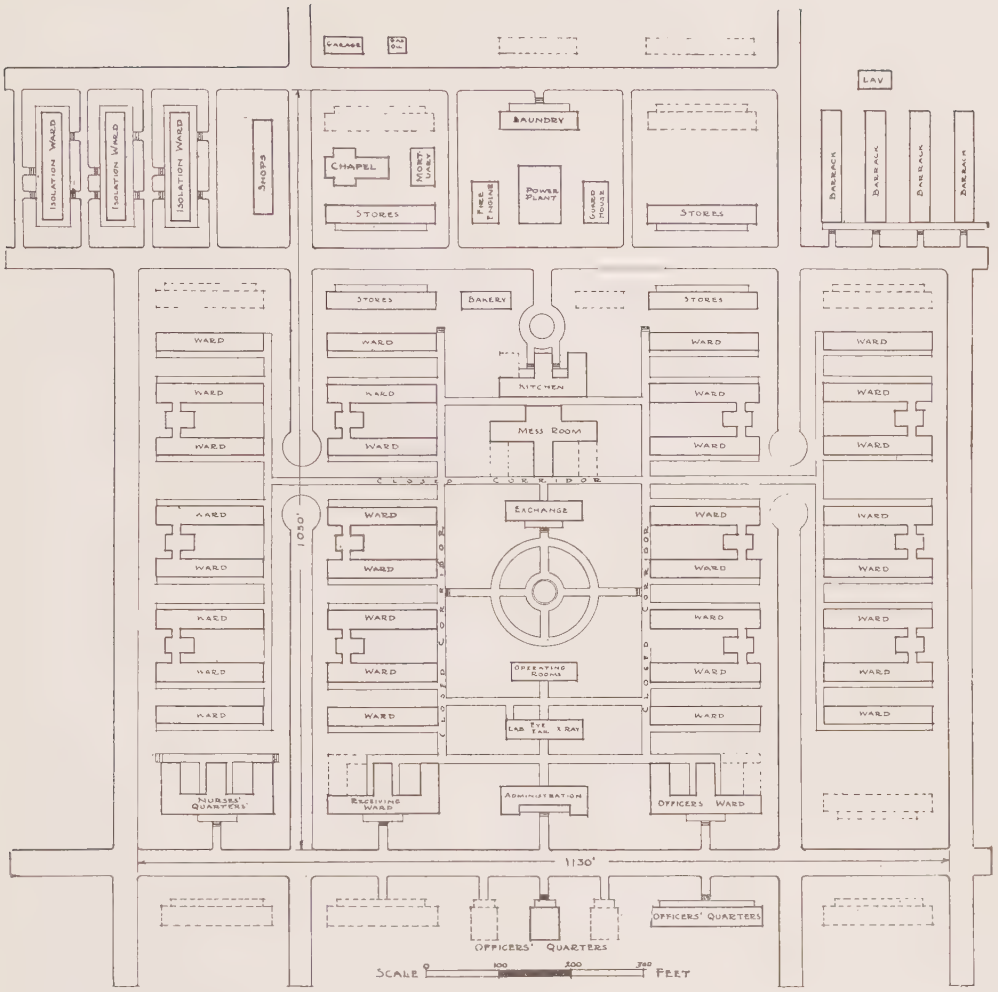
These United States hospital buildings just referred to, like the cantonment barracks, were built of wood, with wooden foundations, and in a temporary manner. With but few exceptions the buildings were only one story in height and in almost every case were connected with each other and with the other units by covered corridors.

The ward unit plans, as first presented by the Surgeon-General's office, contemplated the grouping of the ward buildings in pairs, with the toilets placed between the wards at one end and joined with connecting corridors between the buildings at the other end, as shown in Figure 1. Before the plans were issued for erection, it was realized that enclosing the space between the wards not only cut out light and air, but afforded an extra fire menace and inaccessible pocket, and this plan was abandoned. In some of the wards, however, this form of between-ward toilet was used at the corridor end, but for the greater part the single ward unit was adopted (Fig. 2).

This plan provided for thirty-two patients in one ward and a quiet room for two patients, with diet kitchen, office, toilet, linen room, etc. Each ward had eighteen windows, a total of 278 square feet, or 12.3 per cent. of the wall surface. A 12-foot balcony extended along one side, a feature which was a decided advantage in the southern climate and for treating certain diseases, but which greatly reduced the air and sunlight for the ward itself.

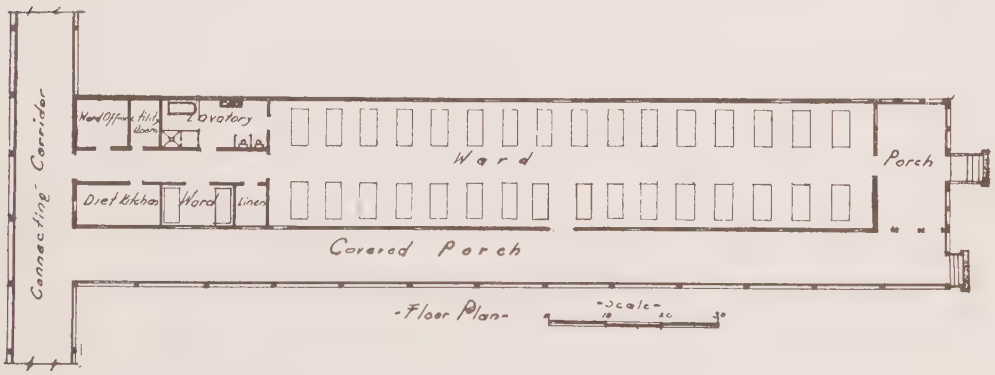
As a very large proportion of army hospital patients are ambulatory, it was found to be economy to build additional two-story wards for these men, as well as for convalescents. Each of these units consisted of four wards or dormitories, two day rooms, toilets, and balconies, but contained no provision for the service of food.

While the orienting of the wards on the site is almost as important as the plan, the general thought of the officer in charge of the planning of the hospitals was that "the hospital must face the cantonment," and the question of sunlight and air was largely disregarded. One noteworthy example, however, was at Camp McClellan, Anniston, Ala., where the grouping and orientation were vastly improved. (See Fig. 3.) True



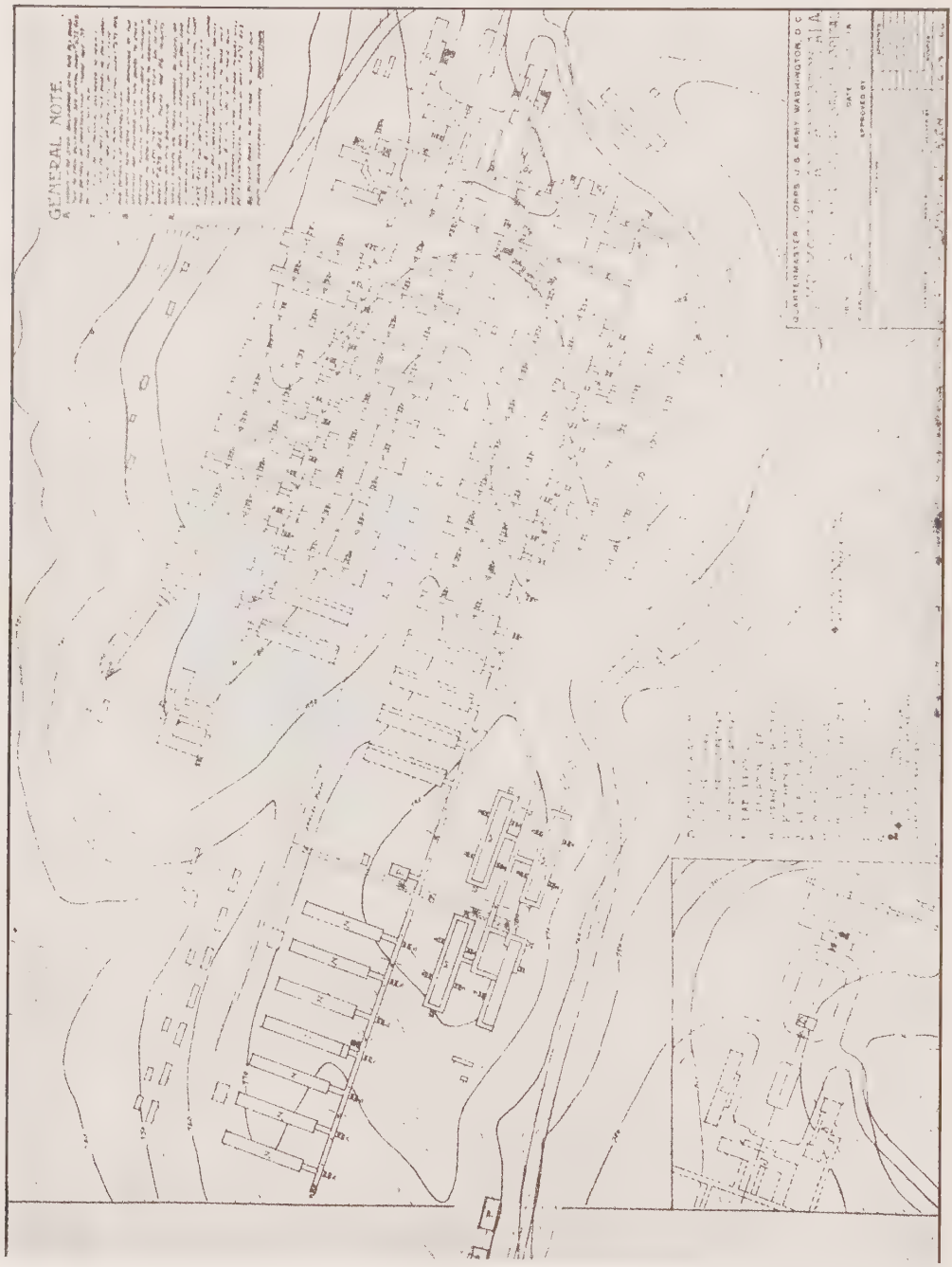
Courtesy "The Modern Hospital"

Fig. 1. Plan for Base and Cantonment Hospital, as first presented by the Surgeon-General's Office (May, 1917).



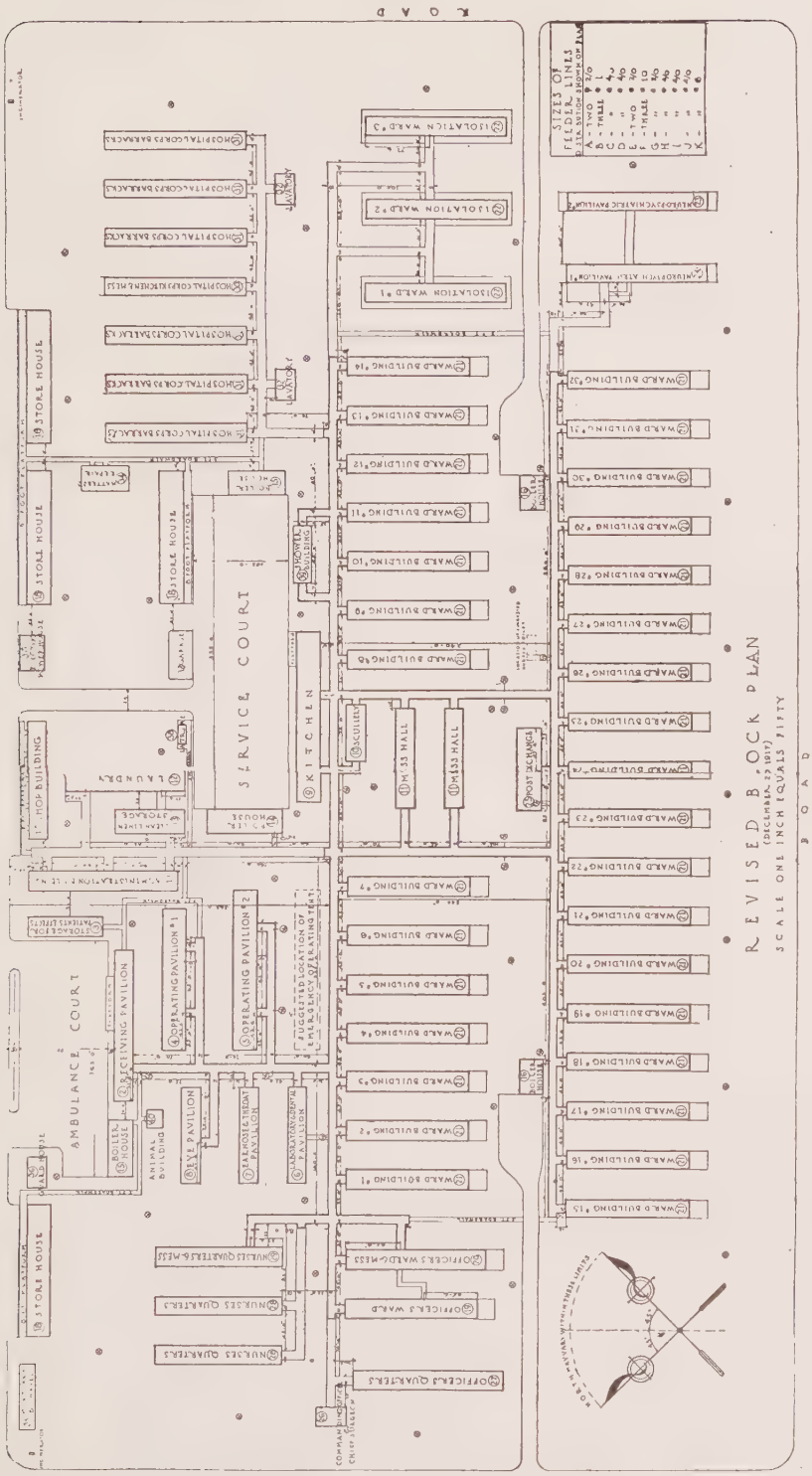
Courtesy "The Modern Hospital"

Fig. 2. Plan for Base Hospital Unit (Sugeon-General's Office, August, 1917).



Courtesy "The Modern Hospital"

Fig. 3. Camp McClellan, Anniston, Ga. This is an improvement over the earlier Camps in which it was considered necessary for the Hospital to "face the cantonment," even at the expense of light and air.



Courtesy "The Modern Hospital"

Fig. 4. General Plan for Overseas Unit. Adopted under the direction of Chief Engineer, U. S. A. (Dec. 20, 1919). The ground covered by this unit is 1550 feet by 750 feet.

it was with the general plan (Fig. 1) that in whichever directions the hospital faced, 50 per cent. of the ward would receive the maximum amount of sunlight and air, at the expense of the other 50 per cent. Of course, it was necessary in the thirty to forty groups to erect the buildings on the sites selected, and it is to be surmised that few "faced the cantonments."

The planning of our overseas hospital units then followed, and these plans were developed under the direction of the Chief of Engineers, U. S. A. A new general plan was adopted, so arranged that the maximum amount of sunlight and air would be obtained for all wards or patients' buildings (Fig. 4) and that the administrative portion would be centralized.[1]

As the overseas hospitals were designed to be fabricated at a distance and shipped ready to erect, the buildings were confined to certain standard widths. The ward unit, however (Fig. 5), was designed to obtain the maximum amount of light and air for the patient.

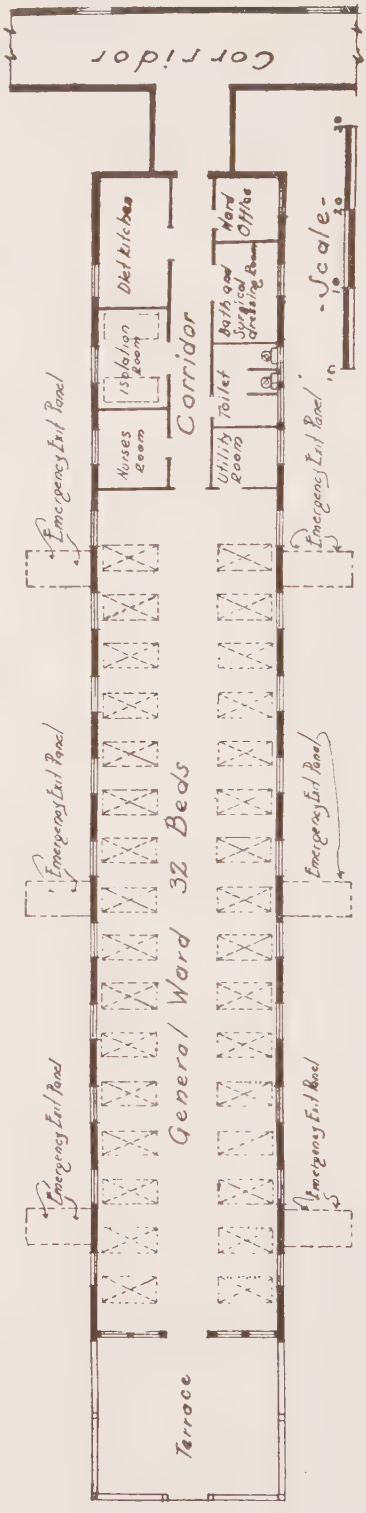
A standard of thirty-two beds was provided, and the general utilities were made similar to the plans made by the Surgeon-General's office, but the method of lighting and ventilating was improved by increased window sizes, so that 24.5 per cent. of the wall surface was glass and capable of being opened 100 per cent. of the glass area. The airing balcony was placed at the south end, leaving the sides free for light and air. These wards were to run approximately north-south, with the airing balcony at the south, leaving a space between buildings of 33 feet.

Removable panels forming ramps gave extra provision for emergency exits, by which the patients could be speedily removed.

Double floors, walls, and roofs insured protection from heat and cold.

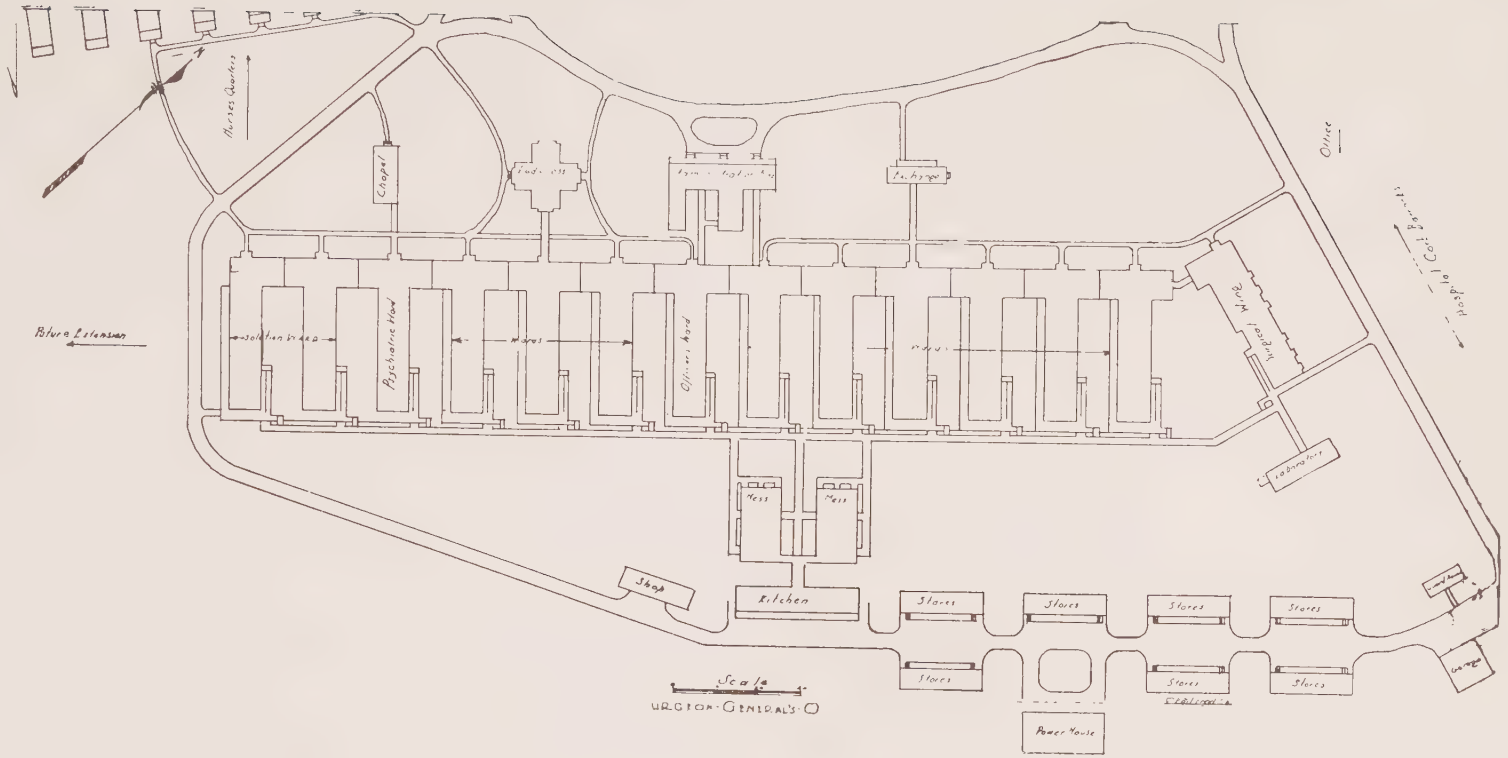
While many slight changes were made in the Surgeon-General's ward unit running from K-1 to K-30, the same gen-

1. The planning of these units was placed in the hands of Mr. Charles Butler, who had served the French Government in constructing army hospitals, and of the writer.



Courtesy "The Modern Hospital"

Fig. 5. Ward Unit of the Overseas Hospital. Fabricated in the United States and shipped, ready to erect.



Courtesy "The Modern Hospital"

Fig. 6. General plan, base Hospital, Camp Knox, Ky. A New Head-house type of Hospital. This provides a more concentrated plan and one easier of Administration (Surgeon-General's Office, October 10, 1918).

eral scheme prevailed for the army hospitals in this country, until the so-called "head-house" type of hospital was developed. This was brought about by the desire for a more concentrated plan, one covering less area and consequently easier of administration, and allowing for greatly increased capacity.

This general plan (Fig. 6) called for buildings practically all to be two stories in height, the ward buildings being pavilions joined to the head-house. Each ward unit consisted of two 100-bed wards, twenty single or quiet rooms, toilets, diet kitchens, etc. (Fig. 7.) The wards are 11 feet in the clear height, 48 feet wide, with beds arranged in four files. There are twenty-six double windows on each side, taking up 23 per cent. of wall area. The heads of the windows were placed 2 feet 5 inches from the ceiling to the sash, and the cubical contents were minimized by using a flat instead of a sloped ceiling for the second story. The light is reduced by a wide side airing balcony and by ramps on the opposite side from the balconies. A gallery connecting the pavilions on the south affords a means of escape in case of fire and a means for the ambulatory patients to reach mess in pleasant weather. The private or quiet rooms are placed on a corridor which is the main artery of communications and for supplies and which in some cases is over 1,000 feet long, lighted by direct light only at the ends.

The orientation generally is good, as all wards run north-south, but the precedent here established by the government of placing one hundred sick soldiers in one room or ward, with but 3 feet between the beds and without subdivisions, is one which civilian hospitals would not dare to follow.

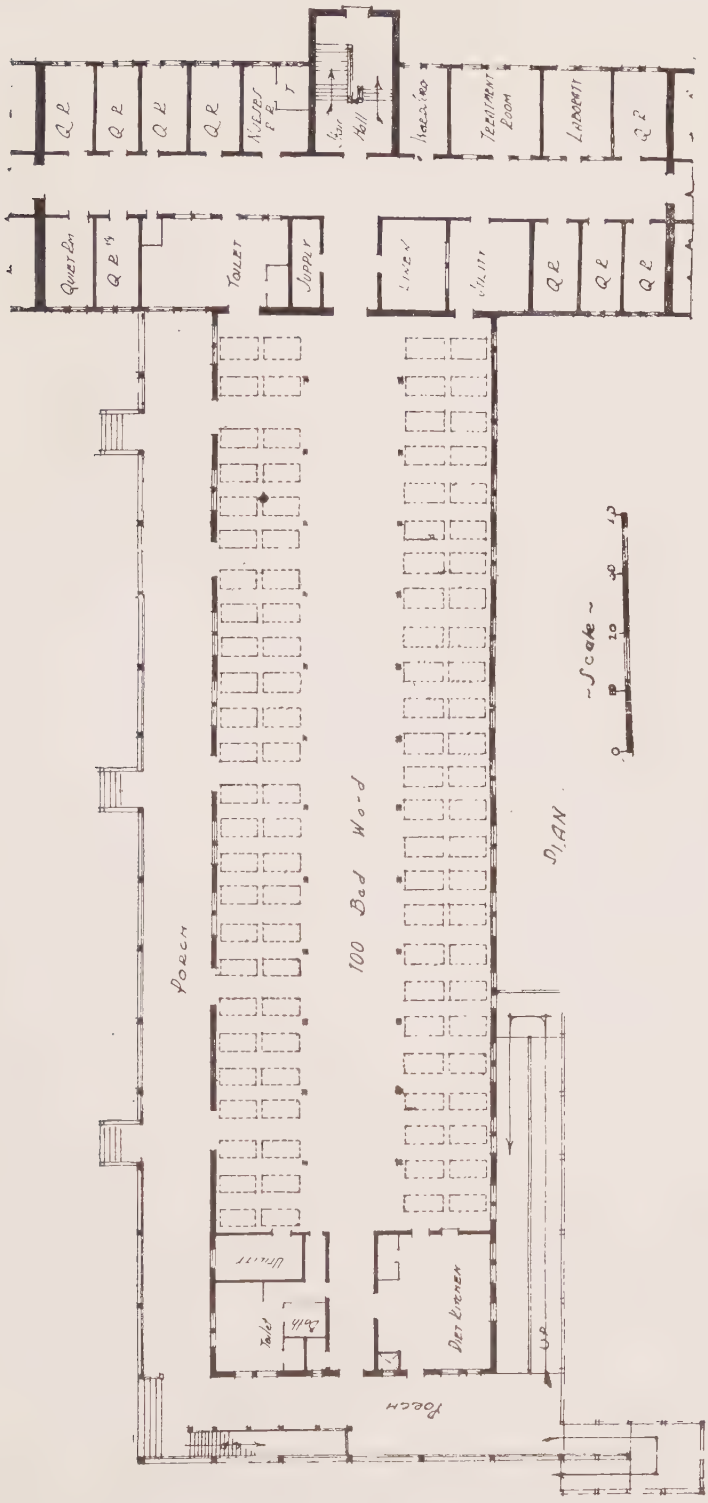
That psychiatric ward unit, planned to occupy the same area and to be capable of conversion into a general ward, is shown here (Fig. 8). While the subdivisions would seem well proportioned, the difficulty of administration is apparent from the fact that in passing from the main corridor to the south exit, one must pass through no less than eight doors, which must be unlocked and locked after every passage. This could have been avoided by a continuous corridor.

In the isolation unit of the type (Fig. 9), there would seem to be an insufficient number of isolation rooms, and the main toilet, having little use in this unit, would seem unnecessarily large. The wide airing balcony, too, could safely be used only by patients suffering from the same disease.

Numerous types of wards for the care of tuberculosis were developed, but only two are here described. One of these consisted of a double row of beds, facing an open south front; another, built on the so-called "King plan," was known as the "shack" arrangement. While in the double plan the patient may be protected from his neighbor by the screens which are "staggered" to prevent one patient from being placed directly in front of another, the back row, nevertheless, would receive the minimum benefit of the "cure" because of the blocking up of light and air by the front row and the impracticability of moving the beds into the sun. In the shack plan, however, this objection does not occur, and the patient is protected from his neighbor by the screen and may have his bed moved into the sun at will. The day room and dressing-room are common to the two wards and are essential to the comfort and well-being of the patients.

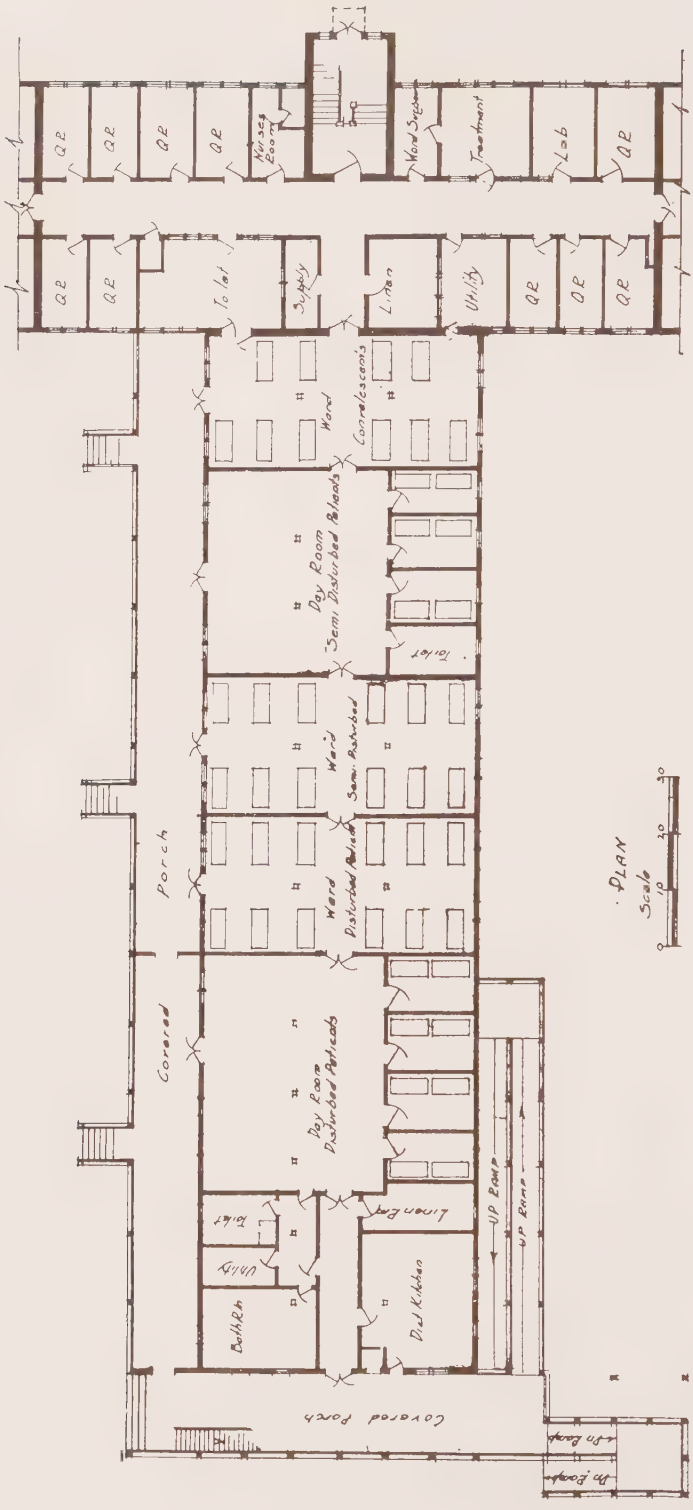
After this later head-house type of ward buildings were well under way and materials ordered, the Assistant Secretary of War in October appointed a committee of three hospital architects[2] to review and offer constructive criticism of the existing and proposed hospital buildings. After a careful study of all the plans for hospitals so far developed in the Surgeon-General's office and after a further study of existing buildings erected, in use, and in course of erection, this committee realized that to provide for large units of from one to two thousand patients, some form of two-story buildings must be used in order to economize both in ground area

2. Consisting of Mr. Charles Butler, Mr. L. M. Franklin (of York & Sawyer), and the writer.



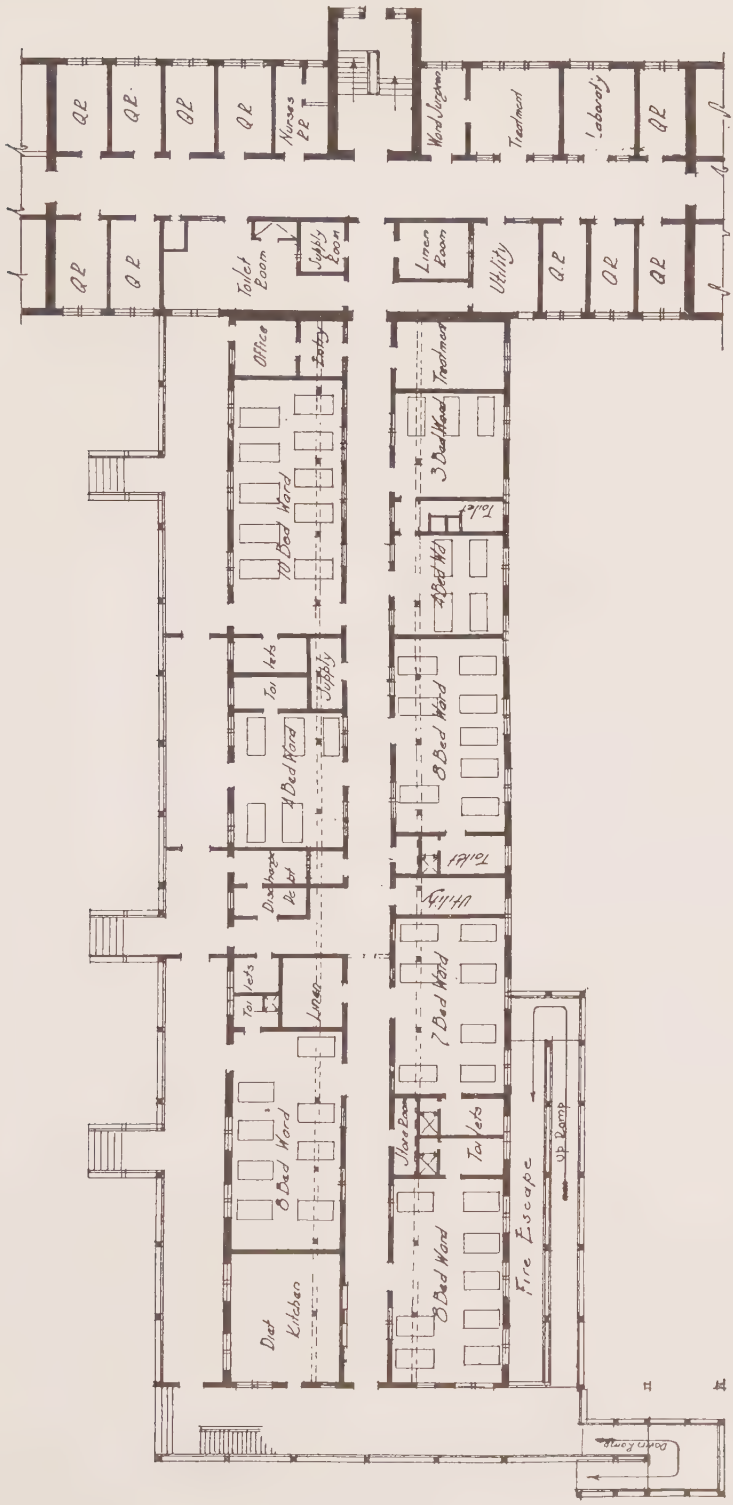
Courtesy "The Modern Hospital"

Fig. 7. Hundred-bed Ward Units of the Head-house type of Hospital.



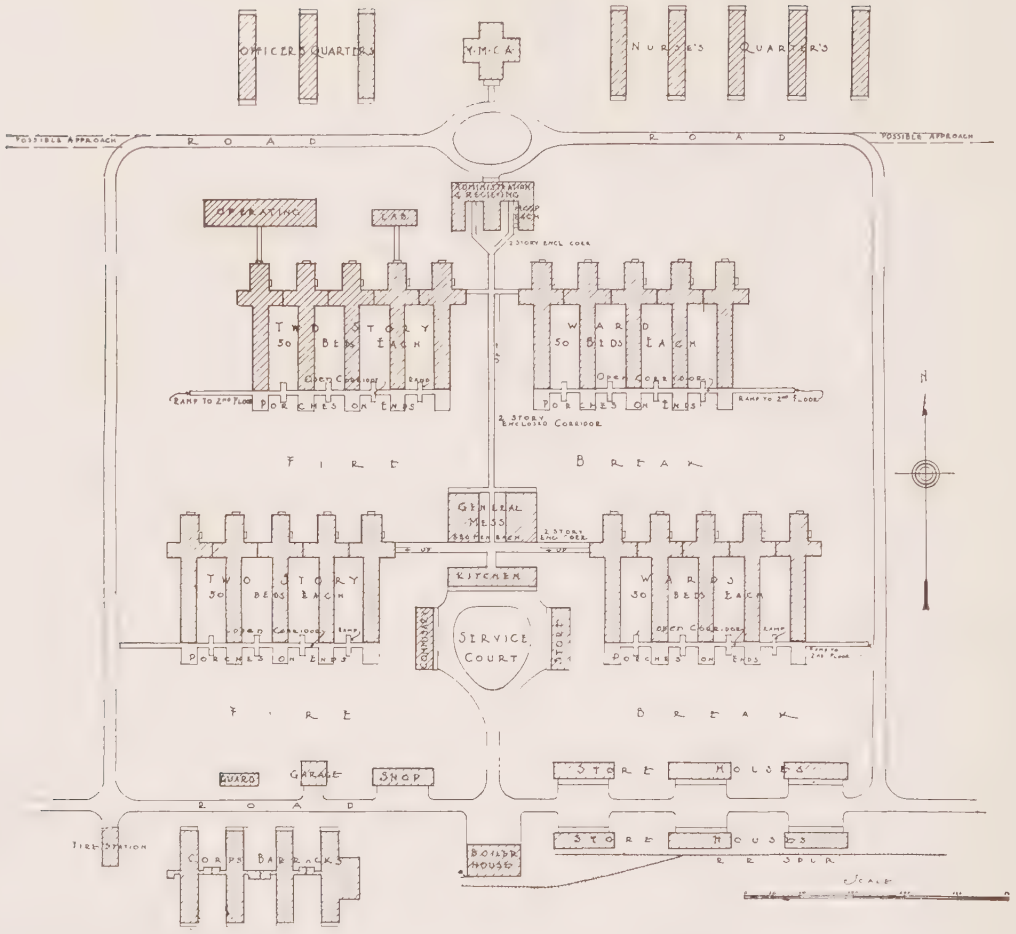
Courtesy "The Modern Hospital"

Fig. 8. Psychiatric Ward Unit, capable of conversion into General Ward (Surgeon-General's Office, Aug. 21, 1919).



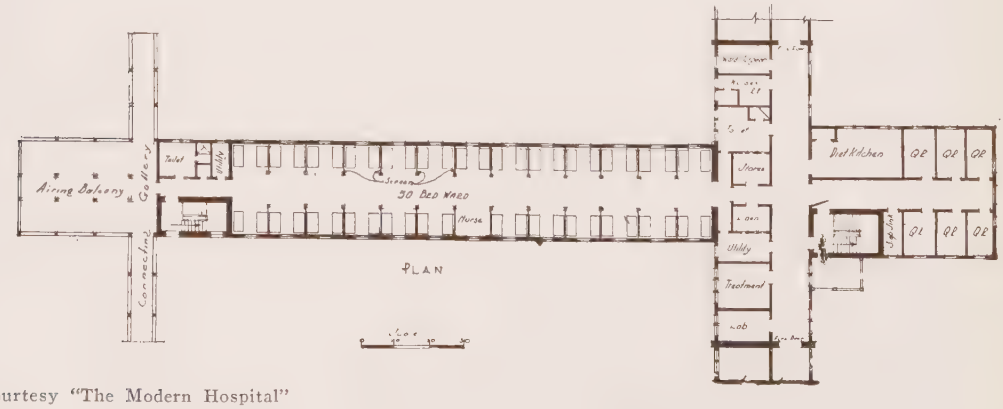
Courtesy "The Modern Hospital"

Fig. 9. Isolation Unit of the Head-house Hospital.



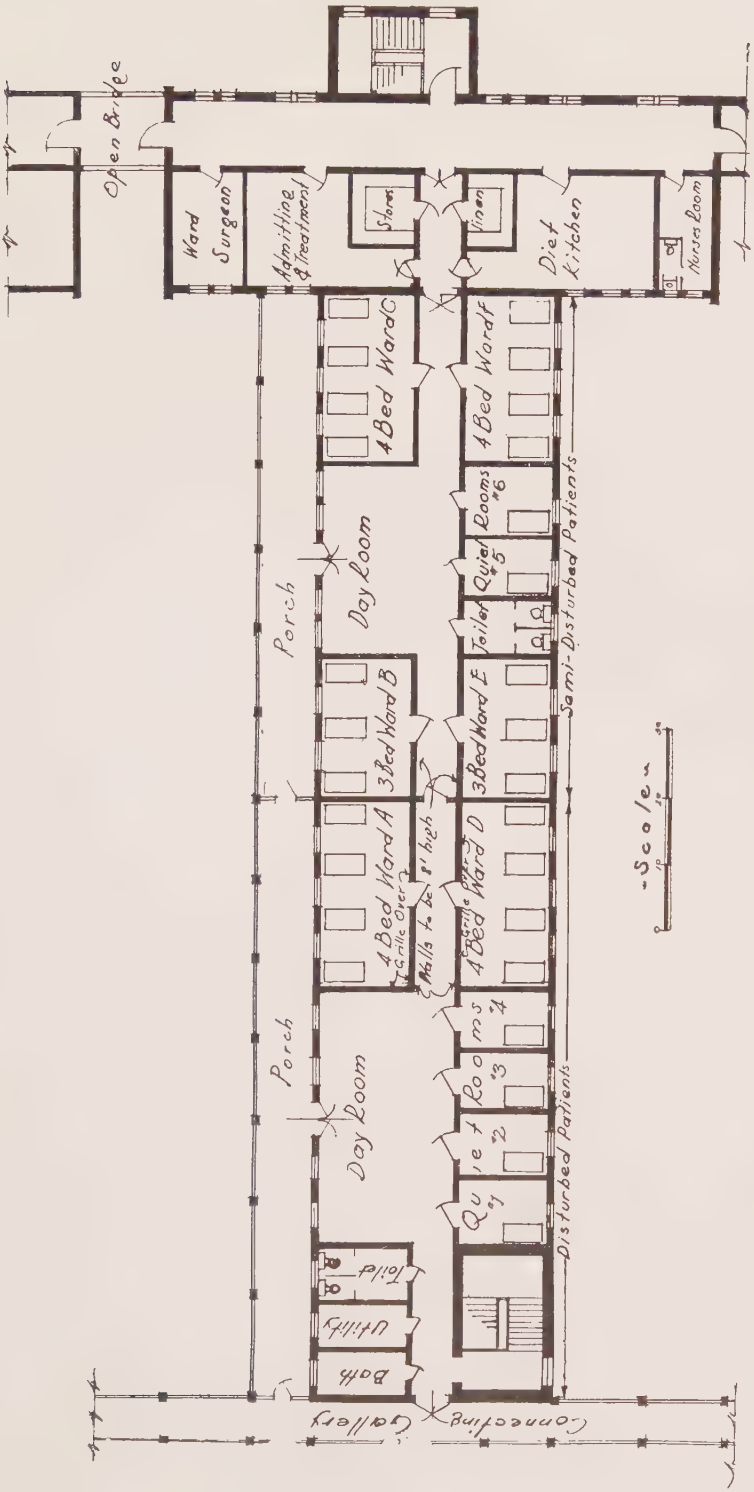
Courtesy "The Modern Hospital"

Fig. 10. General Block Plan for a 2,000-bed Hospital. Proposed by Committee of three on Army Hospital Plans (November, 1918).



Courtesy "The Modern Hospital"

Fig. 11. New General Plan for Wards of Fifty Beds, divided into two-bed cubicles.



Courtesy "The Modern Hospital"

Fig. 12. Psychiatric Ward Recommended by Committee. Provision is made for twenty-eight patients.

and in cost of administration and at the same time to afford sufficient protection to the patient and prevent the spread of contagion. The general plan (Fig. 10) shows how the ward units attached to the general corridors are grouped around the central buildings.

The new ward unit (Fig. 11) was designed, providing for fifty beds in each ward instead of one hundred. The utilities were placed on the south of the through corridor, which is lighted abundantly on the north. The ward is 28 feet wide, with one file of beds on either side of the center. The side is 27.6 per cent glass, which is capable of opening 100 per cent for air; the windows, being carried to the ceiling, afford the maximum ventilation. A low screen is placed between each two beds, protecting one patient from another. No sunlight is cut off on the east or west, but an ample balcony is provided on the south. A gallery connecting wards at the south end and ramps at either end of the group affords an exit in case of fire and a quick way to reach the mess hall. The quiet rooms are in an extension at the north of the connecting corridor, with east and west exposure. The corridor, amply lighted on the north, connects with all departments.

Fireproof stairs at either end of the unit and the ramp at either end of the second-story gallery afford ample fire exits.

In the psychiatric ward recommended by the committee (Fig. 12), provision was made for subdivisions similar to those adopted in the wards designed by the Surgeon-General's office, but with ready access to one section from another, and with the ward divided for disturbed and semi-disturbed patients, with a separate day room for each. In the disturbed portion, four quiet rooms for the violent patients were provided, together with two four-bed wards; in the semi-disturbed section, two four-bed and two three bed wards and two quiet rooms were planned.

The unit is so arranged that in passing from the diet kitchen to the extreme south end of the building, it is necessary to pass through but two doors, each ward being separated from the main corridor. Ventilation is secured by making all the walls of the interior partitions but eight feet high; in the disturbed portion, the walls are continued by substantial grilles. Doors into the admitting and treatment department, the diet kitchen, the nurses' room, and the ward surgeon's room open from the main corridor.

Provision is made for limited continuous bath, as from observation and consultation with the specialists it was found that one bath for each unit would be sufficient in the army hospitals.

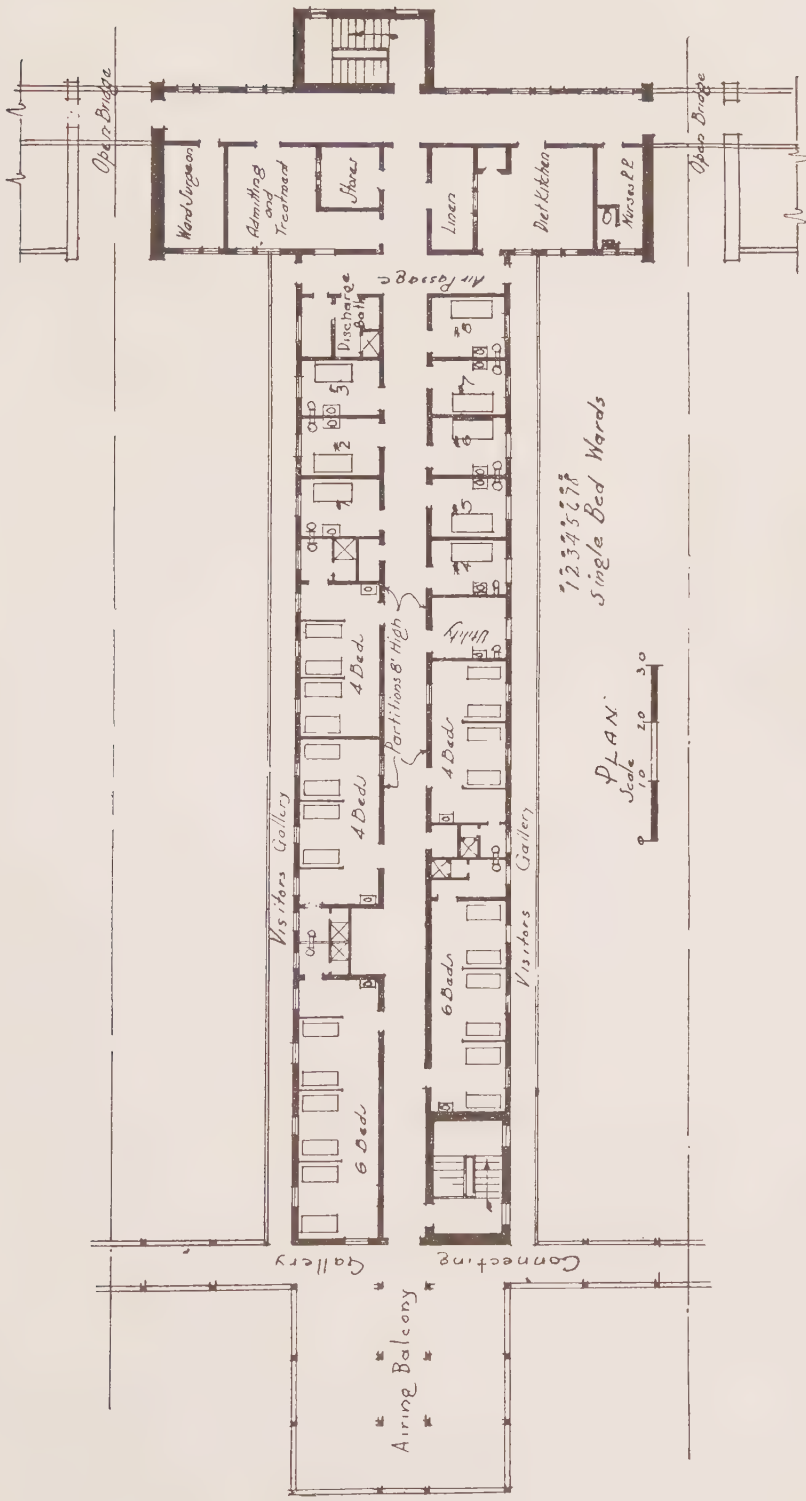
In the isolation plans submitted by the committee (Fig. 13), the principles of the Pasteur Hospital were recognized; a large number of isolation cubicles were constructed, each cubicle provided with sink and watercloset. In four and six-bed wards, each two beds are separated from the others by a low screen to minimize the possibility of cross-infection.

Narrow open galleries surrounding the building make observation and communication with patients possible from out-of-doors, making practicable the visiting of friends with the minimum danger of contagion. Fireproof stairways connect the airing balconies, and the communication balconies are the same in the general ward plans.

Another type of overseas ward unit built at Sarisbury, England, from plans of Arnold Thornley, F.R.I.B.A., for the American Red Cross and for our sick soldiers, presents some new thoughts in the bed arrangement, at least.

This hospital, when completed, will accommodate two thousand beds. Each unit consists of four wards of seventy-eight beds each and a common bath and toilet "block." These toilet and bath blocks, located equidistant from the wards, will be an economy in construction and cubing if they prove to give enough capacity for the needs. The wards are 40 feet wide, with high walls and a ceiling reaching to the roof line, which is crowned by a monitor.

The bed arrangement is unique. While there are four rows of beds, the two inner rows are kept away from each other by a 5-foot permanent screen run-



Courtesy "The Modern Hospital"

Fig. 13. Plan for Isolation Ward, recommended by Committee. This follows the principles of the Pasteur Hospital, providing for a large number of isolation cubicles.

ning down the center of the ward, really dividing the ward into two thirty-nine-bed units; for supervision, however, the attendant standing at the end of the ward, obtains a complete view of the entire ward.

As these wards are but one-story high with numerous exits, the lack of airing balconies may not be noticed. The window spacing (every 6 feet with 3-foot windows) should give plenty of light if carried nearer the ceiling.

The connecting corridors are ten feet wide.

While the "double-ended" ward can obtain only the average amount of sun, there will be a maximum amount of sun on one side if it is oriented east and west. The lack of sufficient utilities and the absence of quiet rooms seems to be the greatest defect in this plan.

These units are built of "cinder brick," a permanent form of construction, and present an attractive appearance.

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